

CANADIAN MACHINERY

AND MANUFACTURING NEWS

Vol. XXV., No. 7

Published by the MacLean
Publishing Company, Limited, Toronto

February 17, 1921

\$4.00 a Year
Subscription Price

READ AND PASS TO	check	See Page	READ AND PASS TO	check	See Page	READ AND PASS TO	check	See Page
						RETURN TO	For	File

Alloyed under the Stanley Process

Lionroyal

Babbitt



*The product of over
half a century's experience*

BRITISH SMELTING & REFINING CO LTD
 DRUMMOND BUILDING MONTREAL and 13 VICTORIA STREET LONDON S.W.1

You can't help noticing the good qualities of
Pratt & Whitney Taps

Their free cutting qualities, their extreme accuracy and their extraordinary ability to outlive others distinguish them.

The con-eccentric relief—a distinctive P & W feature—is the secret of their goodness. One-third of the cutting edge is concentric. The remaining two-thirds has eccentric relief. Taps can be sharpened at the only correct point—on the face of the cutting edge. Sharpening in no way affects their size.

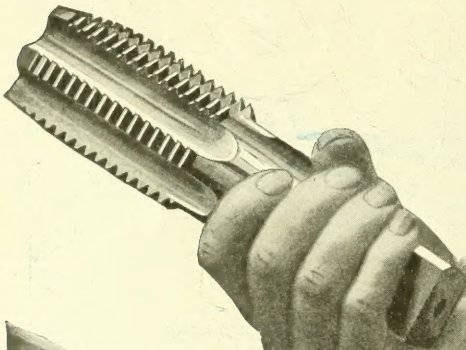
Yes, they cost a little more than some others, but they're well worth the difference. Carried in stock as are all other P & W Small Tools at our sales offices and agencies as listed.

**PRATT & WHITNEY COMPANY
OF CANADA, LIMITED**

Works: DUNDAS, Ontario

MONTREAL	TORONTO	WINDSOR	WINNIPEG	HALIFAX
723 Drummond Bldg.	1662 C.P.R. Bldg.	Davis Building	1205 McArthur Bldg.	Ray Building
VANCOUVER, B.C. Equipment Co.				

“Some Tap”



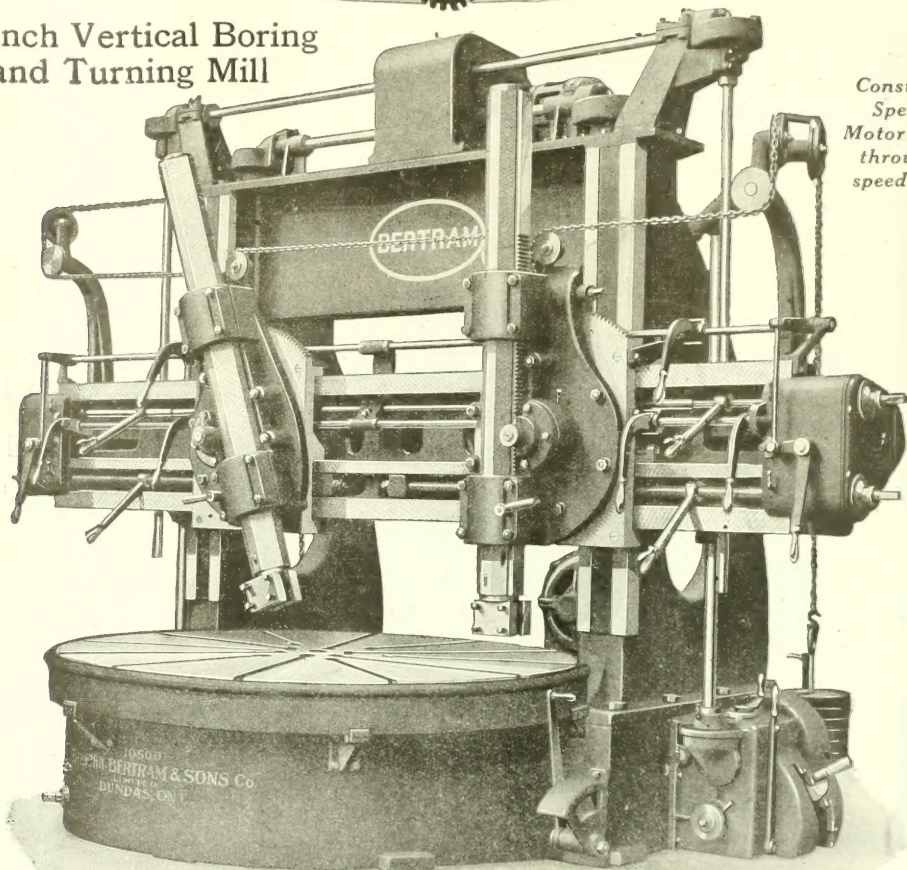
PRATT & WHITNEY

The BERTRAM MACHINE TOOLS Page



84-inch Vertical Boring and Turning Mill

*Constant
Speed
Motor drive
through
speed box*



P-1330

The John Bertram & Sons Co., Limited

DUNDAS. ONTARIO. CANADA.

MONTREAL	TORONTO	VANCOUVER	WINDSOR	WINNIPEG	HALIFAX
723 Drummond Bldg.	1002 C.P.R. Bldg.	609 Bank of Ottawa Bldg.	Davis Bldg.	1205 McArthur Bldg.	Roy Bldg.

If interested tear out this page and place with letters to be answered.

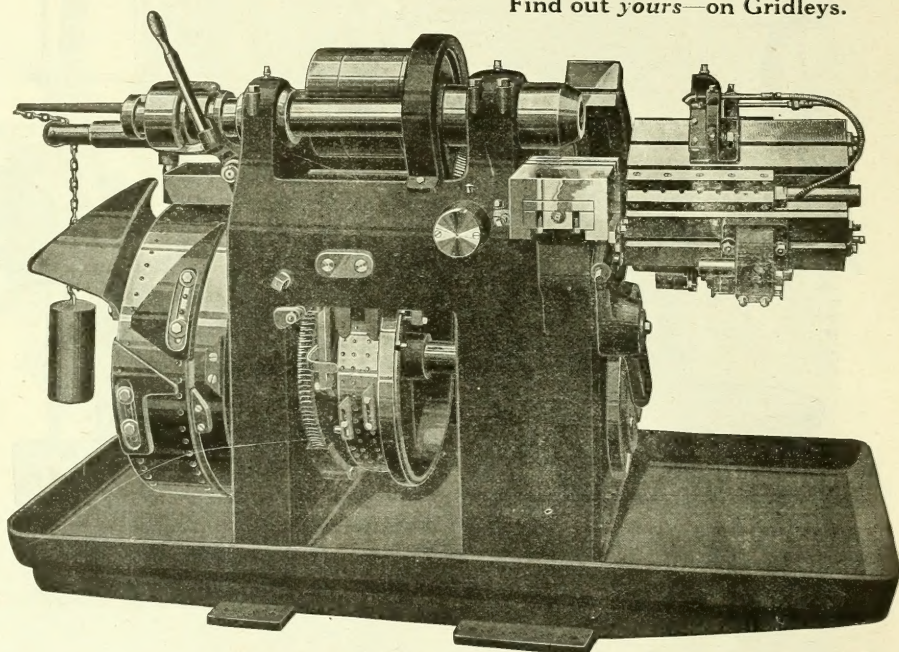
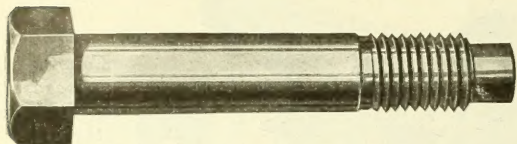
Pushing the Heavy Turning on GRIDLEY AUTOMATICS

Speed of output and accuracy are sometimes strange bedfellows.

With accuracy constantly in the foreground Gridley Automatic Turret Lathes are constructed to be pushed in the long or heavy cut and to stand up under continuous running.

After all, turret lathe efficiency is low per piece cost, and low costs mean simply getting the maximum output per hour and accuracy as good as you want it.

Find out yours—on Gridleys.



2 $\frac{1}{4}$ "

3 $\frac{1}{4}$ "

4 $\frac{1}{4}$ "

THE NATIONAL ACME COMPANY WINDSOR, VERMONT

GENERAL OFFICES, CLEVELAND, O.

CANADIAN SCREW PLANT, MONTREAL, P. Q.

NEW YORK BOSTON
WAREHOUSES: NEW YORK AND CHICAGO

BRANCH OFFICES:
CHICAGO

DETROIT BUFFALO
REPRESENTATIVES IN FOREIGN COUNTRIES

Makers of Gridley Single and Multiple-Spindle Automatics at Windsor, Vermont, and Acme Automatics, Threading Dies, Collapsing Taps, and Screw Machine Products at Cleveland, Ohio

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

How to Save Money on Hack Saw Blades

Do you "get prices" when you buy hack saw blades? If you do, you are fooling yourself.

The place to save money on hack saw blades is not on the purchasing agent's desk, but in the shop.

Cost per blade has but little or nothing to do with hack saw economy. The blade that will really save money for you may cost a little more per blade, but a great deal less per cut. Figure cost by service rendered and you will realize why so many purchasing agents have changed their specifications from "Star Blades or equal" to "Star Blades—no substitute."

You can use one Star Saw on more kinds of sawing and use it longer.

You have fewer blades to buy; that means you have less money tied up in stock and less chances to run out of sizes.

Star Saws are standardized for all kinds of cutting. You can keep a medium-sized blade in your machine and use it for all kinds of work except very large or small cuts.

It is all due to the way Star Saws are made. In Star blades, the greater amount of tungsten and the acute cutting angle of the teeth enable you to go through heavy work almost as easily as light work—the hardest steel as well as the softer metal.

Don't let "prices" fool you. It's the work that the Star does out in your shop that saves you money.

Star Saws are Now Sold By the Makers

We now sell our own product, for we believe no other organization is in such a good position to give selling service on Star Saws as our own factory that has made them for 37 years.

We are not satisfied only to sell you Star Blades, but stand ready to render you every service in getting the best results in their use.

CLEMSON BROS. INC.
MIDDLETOWN, N.Y.

Canadian Offices and Warehouse,
304 Imperial Office Building, Hamilton, Ontario

STAR HACK SAW BLADES

If interested tear out this page and place with letters to be answered.



ALGOMA

STEEL

PRODUCTS

OPEN HEARTH

ALLOY STEELS

CHROME-
VANADIUM

CHROME-
NICKEL
NICKEL

All of these
Steels are sup-
plied in

**HOT ROLLED
BARS.**

We also furnish
in BLOOM,
BILLET AND
SLAB FORM

Sulphuric Acid
Nitric Cake

BLOOMS
BILLETS
SLABS

STRUCTURAL
STEEL

MERCHANT
BARS

CONCRETE
REINFORCING
BARS

IRON, BRASS
AND BRONZE
CASTINGS

STEEL RAILS
Open Hearth
Quality (All Sec-
tions from 12
lbs. to 100 lbs.
per yard).

SPLICE BARS
STEEL
TIE PLATES

PIG IRON
BASIC
FOUNDRY
MALLEABLE

SULPHATE OF
AMMONIA

For the better
convenience of
customers who
may find it ne-
cessary to secure
rush shipments
of particular
items, we are
keeping a large
stock of all the
various standard
sections con-
stantly on hand,
and to this end
extensive ware-
house facilities
are being pre-
pared. Your en-
quiries and busi-
ness will be ap-
preciated.

May we have your next order?

Algoma Steel Corporation, Limited
SAULT STE. MARIE, ONTARIO

Sales Offices: Montreal—606 McGill Building. Toronto—Bank of Hamilton Building

PETRIE

Supplies Everything
for the Machine Shop

AIR COMPRESSORS
BLOWERS
FANS
FORGES
ENGINES
BOILERS
ELECTRIC MOTORS
TANKS
PUMPS
BELTING
HANGERS
PULLEYS
SHAFTING
TINSMITH TOOLS
PORTABLE CRANES

EVERYTHING IN
MACHINE SHOP
SUPPLIES



ARBOR PRESSES
BOLT CUTTERS
BORING MILLS
DRILL PRESSES
GEAR MACHINES
GRINDERS
HACK SAWS
HAMMERS
KEYSEATERS
LATHES
MILLERS
PIPE MACHINES
PLANERS
POWER PRESSES
PUNCHES

EVERYTHING IN
MACHINE SHOP
EQUIPMENT

H. W. PETRIE, LIMITED

TORONTO and HAMILTON

CANADA'S DEPENDABLE
MACHINERY
AND SUPPLY HOUSE

THE MORSE CHAIN CO.

are the
Largest Manufacturers in the world
of
High Speed Silent Chains

Why?

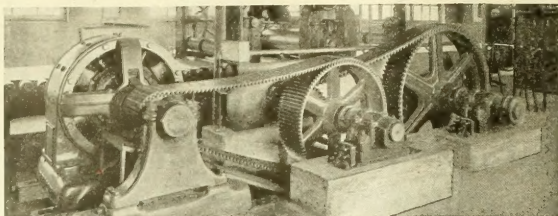
Morse Chain possesses the exclusive
Rocker Joint

Frictionless—Requires no Oilbath.

Jones & Glassco (Reg'd.)
Canadian Agents

Montreal

Toronto



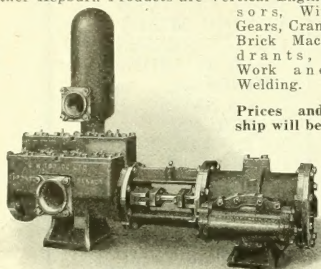
80 H.P. Morse Drive to Rolls, reverses direction every 45 seconds

HEPBURN PATENT FEED PUMPS

The self-draining feature, simple construction and long strokes of Hepburn Patent Feed Pumps make them the most desirable pumps for many purposes. With no levers or tappets to require adjustment they are capable of high efficiency with a minimum of attention. The Hepburn is the only self-draining Steam Pump made in Canada. We can supply repair Parts promptly and overhaul old Pumps.

Other Hepburn Products are Vertical Engines, Compressors, Winches, Cut Gears, Cranes, Derricks, Brick Machinery, Hydrants, Blacksmith Work and Acetylene Welding.

Prices and Workmanship will be right.

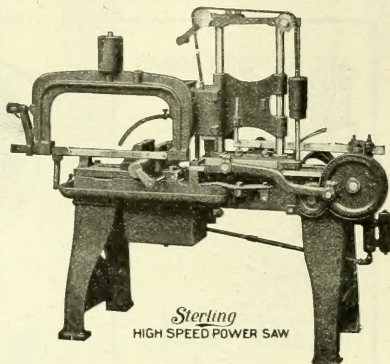
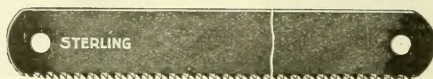


JOHN T. HEPBURN, LIMITED

Engineers and Iron Founders

18-60 Van Horne St., Toronto, Canada

"STERLING" HACK SAWS



Sterling
HIGH SPEED POWER SAW

MANUFACTURED BY
DIAMOND SAW & STAMPING WORKS
BUFFALO, N.Y., U.S.A.

ELECTRIC AND OXY-ACETYLENE WELDED STEEL TUBING ALSO BUTT SEAM TUBING

Prompt service in supplying Steel Tubing for all purposes. Fully equipped for Butt Seam Tubing. Hot or cold-rolled finish. Our plant is fully equipped for slitting all gauges of stock from sheets or coils, also equipped for Bending 16-Gauge or lighter, any shape or radius. Enquiries solicited.



233 Dufferin Street, TORONTO, Canada



We are prepared to give expert advice on the selection of tubing for various purposes. This service costs you nothing and may save you a lot of expense.

ALWAYS SPECIFY



MORSE

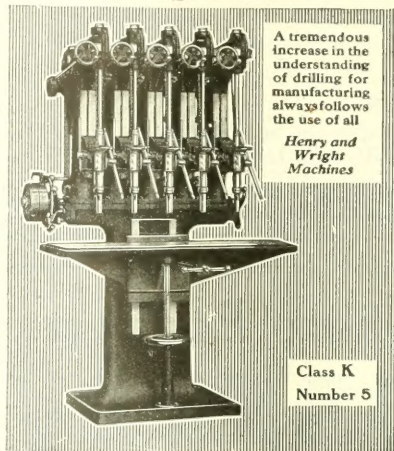
TOUGH
ENDURING TOOLS

**FAST
CLEAN CUTTING
TAPS**

Morse Twist Drill & Mch. Co.
NEW BEDFORD, MASS., U.S.A.

Furnished in
V, USS and Whitworth Threads

HENRY & WRIGHT Drilling Machines



The Henry & Wright Mfg. Co.

Hartford, Conn.

New York Office: 136 Cedar Street

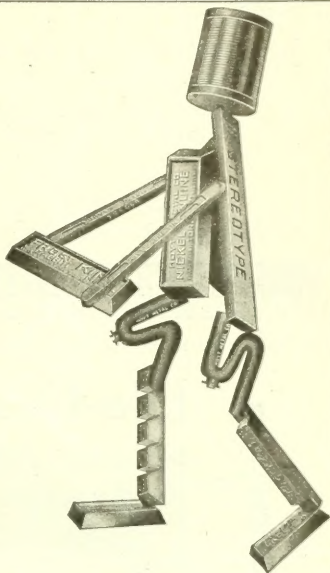
Canadian Fairbanks-Morse Co., Montreal, Toronto, Winnipeg;
A. R. Williams Machinery Co., Toronto, St. John, N.B.; H. W.
Petrie, Ltd., Toronto; Williams & Wilson, Montreal; Rudel-
Belnap Machinery Co., Montreal; Canada Machinery Corp., Galt,
Ont.; Geo. F. Foss Machinery & Supply Co., Montreal; General
Supply Co., Montreal.

FROST KING BABBITT

will with-
stand
heavy
pressure
without
increasing
its tem-
perature.

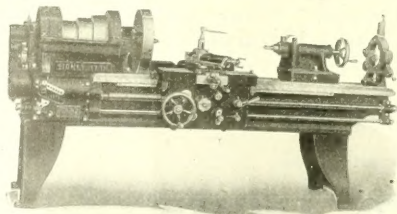
For
general
machinery
bearings
it is with-
out a peer.

If you
are from
Missouri
try a
sample lot
and be
convinced.



HOYT METAL COMPANY

MONTREAL TORONTO WINNIPEG



An Easy Master of Big Jobs

SIDNEY

Heavy Duty Engine Lathes

The surplus strength and rigidity of the Sidney makes it the ideal lathe for the "Big Job."

Illustration shows 25-inch Heavy Duty, Quick Change. Bed lengths in 10, 12, 14, 16, 18 and 20 feet. Write for details.

The Sidney Tool Company, Sidney, Ohio, U.S.A.

Canadian Agents

Yeates Machinery & Supply Co., Montreal, Que.

H. W. Petrie, Limited, Toronto, Ont.

THE JOHNSON FRICTION CLUTCH

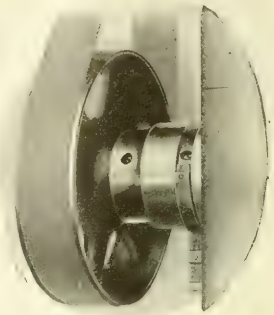
Put Johnson Clutches on Your Machines

The tight and loose pulley is passing from favor. With all its disadvantages, it long survived because a reliable friction clutch was not in evidence.

But in the Johnson Clutch, builders of high grade machinery have found a real clutch service. It has been thoroughly tested and adopted on the finest machines made.

Replace your tight and loose pulleys with Johnson Clutches.

Write for our Yellow Catalog and Booklet,
"Clutches As Applied To Machine Building."



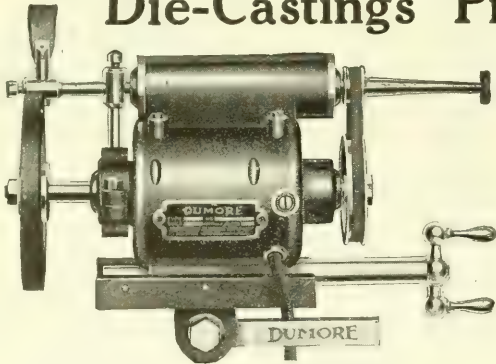
Single Clutch with Pulley Mounted

CANADIAN AGENTS:

WILLIAMS & WILSON, LTD., 84 Inspector St., Montreal
CANADIAN FAIRBANKS-MORSE CO., LIMITED, Montreal, Toronto, Winnipeg

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER, CONN.

Die-Castings Promote Economy



Of course you know of Dumore Grinders—their precision, their long life and their reputation for dependability. Every part of Dumore Grinders except, of course, the spindles, handles, etc., are die-cast.

This is but another example of the extent to which die-castings can be used.

Do you require machine parts in large numbers? If so, you can save considerable expense by having them die-cast.

The making of a quantity of duplicate parts by the die-casting process is both efficient and economical.

Get your die-casting from Fisher—the largest maker of die-castings in Canada. Fisher die-castings are clean and accurate; they require no machining; they come to you all ready to assemble.

Send us your blue prints for estimates

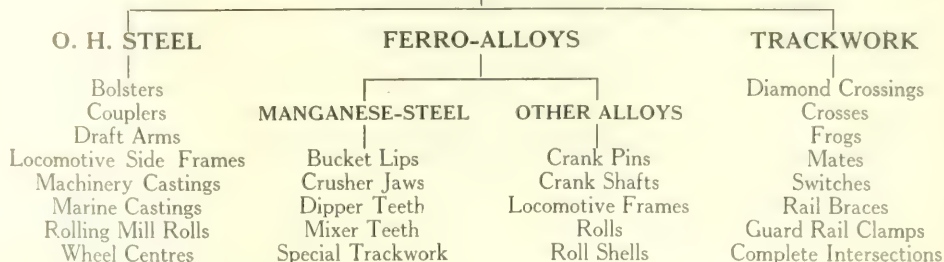


THE FISHER MOTOR CO., LIMITED
ORILLIA, ONTARIO



CANADIAN STEEL FOUNDRIES LIMITED

AMONG OUR PRODUCTS



This list is merely an indication

General Offices:

Transportation Building, Montreal

WE CAN SUPPLY STEEL PLATE —IN—

Universal Edge - up to 40 in. wide

Sheared Edge - up to 60 in. wide

Any Thickness

Any Lengths

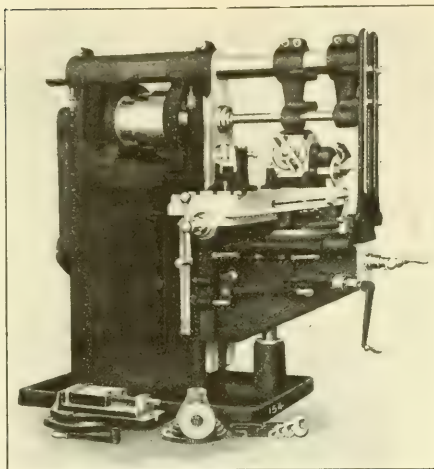
Send Us Your Enquiries.

Dominion Foundries & Steel, Limited
HAMILTON, ONTARIO

Ford-Smith Milling Machines

When the leading machine shops throughout Canada adopt Ford-Smith Millers, there must be a reason. Their choice is governed by these features found in all Ford-Smith Millers

Power and Neverfailing Accuracy.



A Guarantee Of Quality Output

The strong, accurate, well-balanced construction of every Ford-Smith Miller is a positive guarantee of quality production. Made in two types—plain and Universal, and built in sizes for almost every class of milling.

Send for our descriptive catalogue

FORD-SMITH

THE FORD-SMITH MACHINE COMPANY, LIMITED
HAMILTON, CANADA

Foreign Agents: W. E. Storey, London, Eng.; Gollin & Co., Melbourne, Australia; British & Canadian Hydraulic Tube Co., Johannesburg, S.A.

WILLIAMS' "AGRIPPA" TOOL HOLDERS

THE production of superior drop-forged tools is traditional in our works. For nearly half a century our entire energy, equipment and resources have been devoted, wholly and exclusively, to the manufacture of the highest grade of product made possible by the development of the drop-forging art.

Like all of our *standard* Machinists' Tools, Williams' "Agrippa" Tool Holders are built for service—severe service that tries stamina to the utmost. Drop-forged from a special grade of carefully selected steel—scientifically heat-treated and hardened—they are sturdy, dependable tools of proven strength and merit.

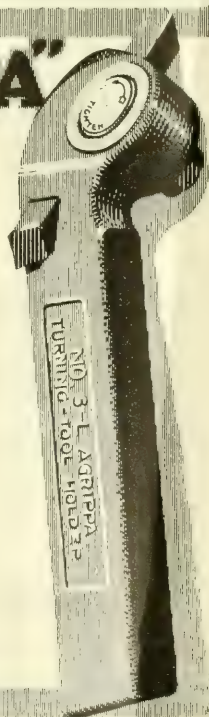
A wide range of sizes in standard patterns for all regular machining operations: Turning, Boring, Planing, Threading, Knurling, Cutting-off and Side Work.

MACHINISTS' TOOLS BOOK ON REQUEST.

J. H. WILLIAMS & CO., LTD.

"The Drop-Forging People"

Formerly the Canadian Works of The Whitman & Barnes Mfg. Co.,
St. Catharines, Ontario





BROWN-BOGGS



B B

Some of the reasons
why the

B-B TRADE-MARK

Stands for

Reliable Service

The designs of the various "B-B" tools are the result of many years' exhaustive experiment and manufacture.

Only the highest quality materials are used in their construction.

Every workman is thoroughly competent.

Our plant is modern and fully equipped.

Before every improvement is adopted it must **prove** its worth.

Each tool, before it leaves the factory, is rigidly tested to insure a high safety factor.

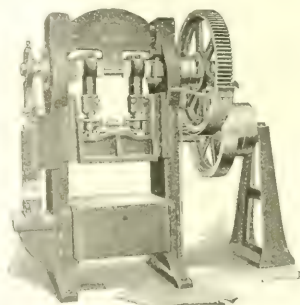
Every "B-B" product is fully guaranteed.



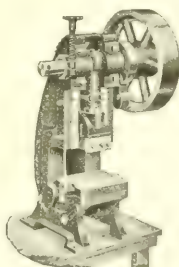
No. 36—Ring and Circular Shear

The "B-B" line comprises smiths' tools and sheet metal working machines of all kinds; canners' and evaporators' machinery, shears of every description, power presses for punching, forming, embossing, blanking.

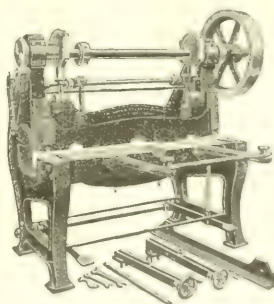
We shall be glad to send you a catalog containing a full description of the tools in which you are interested.



No. 110—Double Crank Trimming Press



No. 10—Bench Press

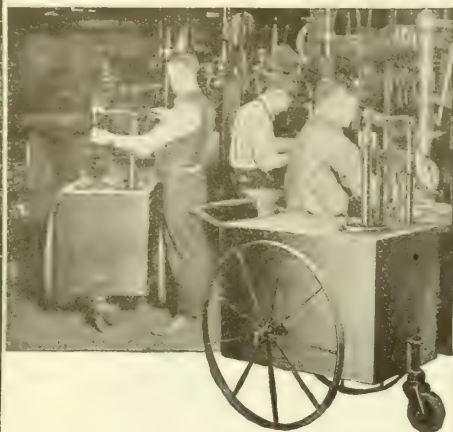


No. 119—Shear



THE BROWN-BOGGS CO. LIMITED

HAMILTON, CANADA.



Take the Oils To The Machines

In a Bowser Portable Outfit and save Mechanics' time. Keep machines working and increase production.

Minutes spent by men in the oil room are wasted—lost. Your men don't want to lose those minutes. The old oil storage simply forces them to do it.

BOWSER

ESTABLISHED 1885

Oil Storage Systems

prevents these losses, bring a day's supply of oil to the machines—no loss of time or oil. Workmen enjoy the convenience and safety of Bowser equipment—employers appreciate the actual money saving effected.

OUR LITERATURE EXPLAINS WHY
WRITE FOR IT

S. F. BOWSER COMPANY, LIMITED

66-68 Fraser Ave., TORONTO, CANADA

OFFICES IN THE PRINCIPAL CITIES OF U.S.

LONDON
32 Victoria, St., S. W. 1

HAVANA
Loma del Comercio 427

PARIS
5 Rue Denis-Poisson

SYDNEY
6 Castlereagh Street

KELLER-MASTER



KELLER - MADE
MASTER - BUILT

The Latest Achievements

— in the development of
the Pneumatic tool industry of the world are represented in "Keller-Master"

Riveting Hammers **Rivet Busters**
Chipping Hammers **Holders-On**
Scaling Hammers **Sand Rammers**
Jam Riveters **Valveless Drills**
Staybolt Riveters **Corliss Valve Drills**

ACCESSORIES

Complete
Catalog on
Request

KELLER

PNEUMATIC TOOL COMPANY
GRAND HAVEN, MICHIGAN
BRANCHES EVERYWHERE

TRAHERN



for Machine Tool use

TRAHERN Coolant Pumps will deliver heavy, forceful streams of water, oil or compound with sufficient force to reach deepest cuts. Less sharpening of tools and fewer spoiled pieces will result.

TRAHERN Coolant Pumps may be installed on any machine and will pump any liquid not containing grit. They will supply 16½ gal. per minute at low speed, reverse automatically, operate against 100 lb. pressure. When properly installed they will not lose their prime.

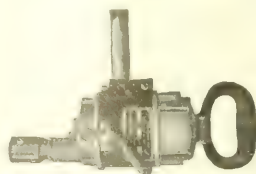
Ask us for Bulletin No. 44

TRAHERN PUMP DIVISION

Geo. D. Roper Corporation
ROCKFORD, ILL., U.S.A.

U. S. Electric Drills and Grinders

Save Time, Labor and Money



3 SIZES

3-16 in., W.G.T. 6 lbs.
 3/4 in., W.G.T. 9 lbs.
 3/8 in., W.G.T. 12 lbs.

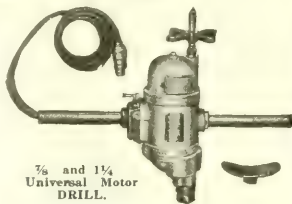
All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.

They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.



7/8 and 1 1/4
 Universal Motor
 DRILL.

For Sale By

The Canadian Fairbanks-Morse Co., Limited

Montreal, St. John, N.B., Toronto, Winnipeg, Calgary,
 Vancouver

THE UNITED STATES ELECTRICAL TOOL CO.
 CINCINNATI, OHIO

Only Sharp Files Do Good Work

It is impossible for a file that is the least bit dull to do its job properly.

Throw your files away as soon as they show signs of dullness, and buy new ones.

If you want to be sure of getting maximum service before wear is apparent, specify one of the following brands, the standard in files:

Kearney & Foot
 Great Western
 American
 Arcade
 Globe
Files

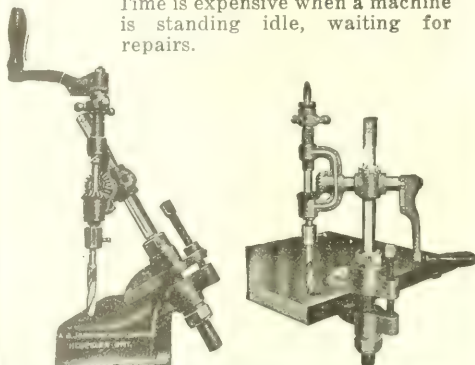
Made in Canada by

**Nicholson
 File Company**

Port Hope - Ontario

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, \$26.50 net.

Sold by all Machinery and Supply Houses.

A. B. JARDINE & CO., Limited
 HESPELER, ONTARIO

IMCO TOOLS



Strength!

Strength to withstand the continual "crowding" which is the usual lot of cutting tools is an outstanding characteristic of all "Imco" drills, reamers and milling cutters.

This feature is of even greater significance when you consider how unique is a tool which combines **both** toughness and cutting power.

Catalog of "Imco" 3 and 4-lip drills, reamers and milling cutters upon request.

Eastern Representatives: WATT MACHINERY & EQUIPMENT CO., 344 St. James St., Montreal, Que.

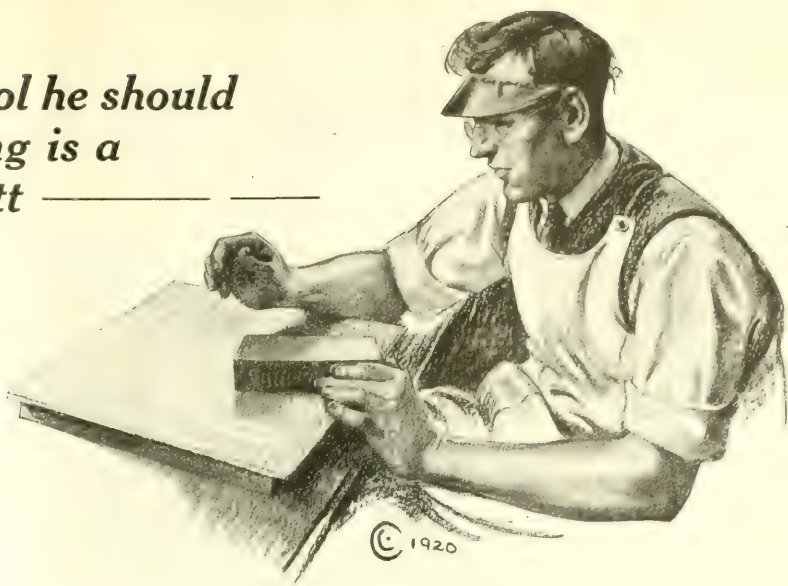
Ingersoll Machine & Tool Co., Ltd.

Ingersoll, Ontario.

Toronto Office — 80 Bay St. Phone Adelaide 7227.

Chas. A. Strelinger Co. Ltd. Windsor, Ont.

*The tool he should
be using is a
Starrett* _____



Have You This Tool in Your Kit?

There are four hermaphrodite calipers of Starrett make. One of these—the tool to be used here—is designed especially for laying out work such as marking lines parallel with the edge of a block, finding temporary centers, etc. Another, designed for less sensitive adjustment, is used where the requirements are not so rigid. Two of them have lock joints, permitting work over flanges, etc.

The caliper this machinist is using may be found in the new Starrett Catalog No. 22. See if you have it in your kit.



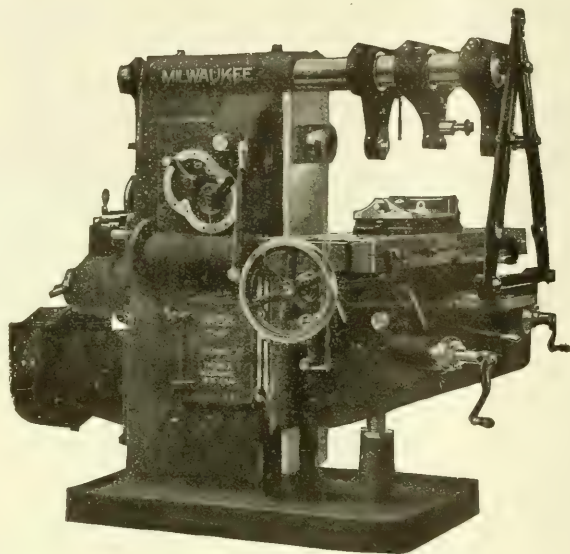
THE L. S. STARRETT COMPANY

The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled
ATHOL, MASS.



Use Starrett Tools

MILWAUKEE MILLING MACHINES



Every Feature An Aid To Milling Economy

TO MEET the varied demands of different classes of work with speed and accuracy, we have incorporated many notable features in Milwaukee Milling Machines which qualify them to accomplish successfully the most exacting requirements. They are designed and constructed to economically perform all classes of milling—light or heavy.

Milwaukee Horizontal Milling Machines possess the double overarm—solid top, box section knee—automatic flooded lubri-

cation system, one and one half gallons of oil per minute flowing over all gears and bearings in the column, feed box and pulley bracket—cutter lubricant pump which functions only when the spindle revolves—flanged spindle with hardened steel collar for driving arbors—constant speed drive, reverse being self-contained.

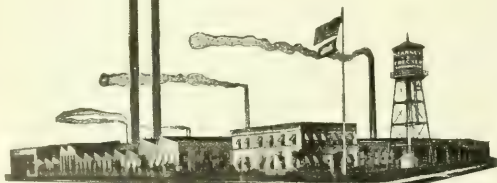
All these features contribute to "Milwaukee" efficiency and profitable production. Let us send our catalogue.

KEARNEY & TRECKER
CORPORATION
MILWAUKEE, WIS., U.S.A.

Canadian Representatives:

Williams & Wilson, Ltd., Montreal
F. F. Barber Machy. Co., Toronto.

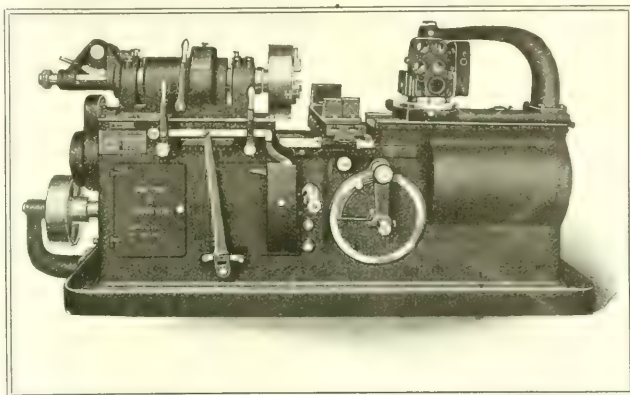
A. R. Williams Machy. Co., Vancouver and Winnipeg.



AUTOMATICS

When times are dull you want to get full value from your labor; you cannot afford to do otherwise and stay in the game. When times are busy you have hard work getting help.

A serious problem from either angle. The solution—Potter & Johnston Manufacturing Automatics for all duplicate parts from castings, forgings, cut-off stock, up to 10 inches diameter and up to 15 inches long.



Potter & Johnston Automatics need but little labor to attend to, one operator being sufficient to take care of a battery of machines. When the time of every operator is known in advance—you can figure with certainty on production.

*Write for detailed particulars of
P. & J. Automatics.*

Find out what they will do for you.

Canadian Offices: POTTER & JOHNSTON MACHINE CO.

ROELOFSON MACHINE & TOOL CO., LIMITED

Head Office and Show Rooms:

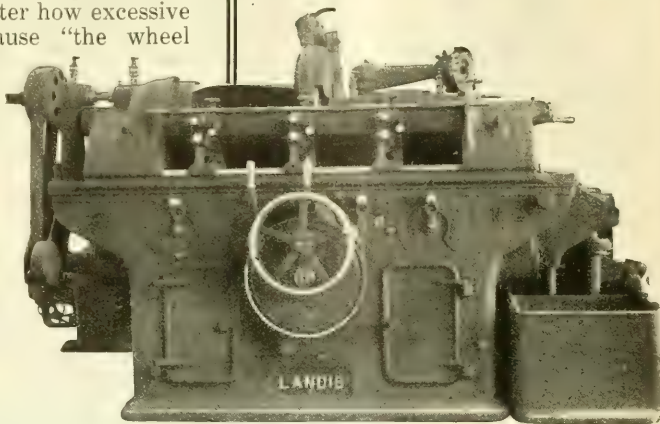
11 Wellington Street East, TORONTO, CANADA

Constant Accuracy

There can be no variation of the degree of accuracy of the Landis. No matter how excessive the tool-load may be, because "the wheel travels"—and the work remains stationary, its accuracy remains constant.

A study of the Landis is necessary to appreciate its many advantages—its compact, rigid, chatter-eliminating construction and the built-in, labor-saving features for which it is noted.

The Landis catalog goes into details. May we send you a copy?



Plain Grinding Machine

LANDIS TOOL CO., Waynesboro, Pa.

50 Church Street, New York City

STEEL *for* Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

**Nova Scotia
Steel and Coal
Co., Limited**

Head Offices:
New Glasgow, N.S.

Sales Offices:
Western Room 14 Windsor Hotel
MONTREAL

Steel Ingots
by the
HARMET
Liquid Process





TRADE

MARK

"A.W." Drills

MILLED OR TWISTED

From the raw materials entering the steel to the finished drill a rigid inspection is given after each operation, which assures a superior product.

High Speed Twist Drills

The Drills for
Maximum
Production

PROMPT DELIVERIES ON SPECIAL SIZES
ALL STANDARD SIZES CARRIED IN STOCK



ARMSTRONG WHITWORTH OF CANADA, LIMITED

Head Office:

298 St. James St., Montreal

126 WELLINGTON ST. W., TORONTO

Works:

Longueuil, Que.

McARTHUR BLDG., WINNIPEG

W. ATKINS & CO. Sheffield ENG

The

HIGH SPEED STEELS

For superior cutting power:

"Double Waco" and

"Waco Superior"

Carbon Tool Steels

For all Purposes.

"Turtle Brand," unequalled for reliability

MINERS' DRILL STEELS

Double Hollow,

Various Sections.



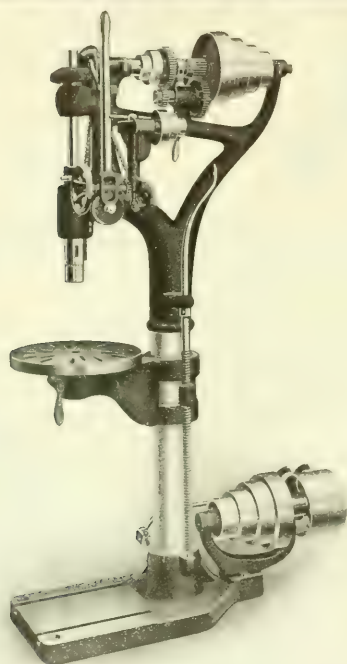
Representative

MARSHALL SON & BUNNEY

39 Richmond St East

TORONTO

DENBIGH DRILLING MACHINES



BUILT IN FOURTEEN SIZES

By the aid of a very efficient plant and organization, we manufacture these machines in large numbers by mass production.

Prices and Deliveries are Right

John M. Terry & Co.

85 Newington Causeway, London, S.E. 1.
CABLES—ATHENIAN, SEDIST, LONDON

MACKINNON STEEL CO., LTD.

*Engineers, Manufacturers
and Erectors of Steel
Structures*

Industrial Bridges, Buildings,
Towers, Smoke Flues and Stacks,
Chutes, Coal Bins, Ore Bins, Tanks,
Cranes, Engine Houses, Grain Ele-
vators, Derricks.

Structural Steel and Steel Plate
Work, and a combination of the
two lines.

Prompt Deliveries Assured

MackINNON STEEL CO., LIMITED

Sherbrooke, Quebec

Montreal Office: 404 New Birks Building

CANADIAN ATLAS CRUCIBLE STEEL Co. LIMITED

Made in Canada

L-XX HIGH-SPEED ATLAS TOOL STEELS ATLAS ALLOY STEELS

**Hot Rolled, Forged Blocks and Discs
Cold Drawn Steel and Drill Rod**

GENERAL SALES OFFICE:

133 Eastern Avenue, TORONTO, ONT.

Works: WELLAND, ONT

Sales Offices and Warehouses:

TORONTO, ONT. MONTREAL, QUE. WINNIPEG, MAN.

STEEL CASTINGS

**QUICK
DELIVERIES**

**High Carbon Steel
Manganese Steel
Chrome Steel
Mild Steel**

**QUALITY
GUARANTEED**

Sizes— $\frac{1}{2}$ lb. to 5,000 lbs. each

**THE WILLIAM KENNEDY & SONS,
LIMITED
OWEN SOUND, ONTARIO
ESTABLISHED 1860**

STEEL CASTINGS

We shall be glad to supply, in addition to our General Catalogue, quotations on:
Steel Castings Lithographed
Galvanizing Ware
Wire Goods Enamelled
Stoves Signs

Made by the Auld Electric process up to fifteen tons. Castings made by this process are free from blow holes, easy to machine and superior in every way to ordinary Steel Castings.

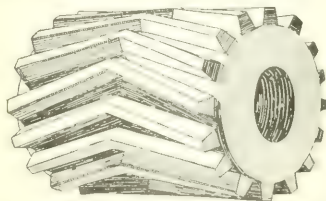
Specialty: special for shipbuilding, cars, construction, all classes of machinery, etc.

The Davidson Mfg. Co. Limited

Head Office: Montreal.

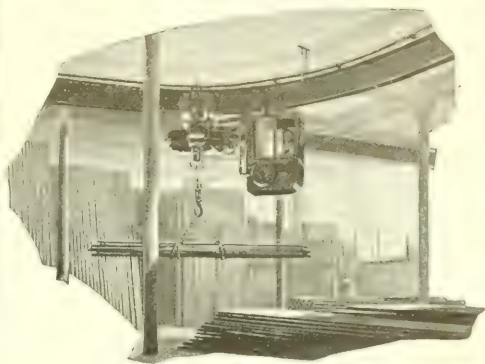
Branches: Toronto and
Winnipeg

Steel Foundry Division:
Lachine Canal, Turcot.



DAVIDSON

SHEPARD ELECTRIC CRANES & HOISTS



Overhead, out of the way —

a "Shepard" tracks along on a Monorail—if necessary, picking a load at one extreme of the plant, carrying and putting it down at the other. One man, the operator in the traveling cage, controls every operation. A Shepard Monorail system takes up no floor space; it is out of the way, and utilizes space that could not be used otherwise.

A Shepard Electric Hoist is economical to operate, and is easily maintained. Dirt, dust, fumes, and dampness can in no way "touch" electrical and mechanical operative mechanisms which are contained within tight metal housings.

Shepard engineers will gladly talk with you regarding a more economical means of transferring and rehandling for your business. Their services do not obligate you.

"Shepard" makes Electric Hoists $\frac{1}{2}$ to 30 tons; Electric Traveling Cranes 1 to 50 tons; Electric Winches; and Cargo Handling Equipment for Docks and Ships.

Shepard Electric Crane & Hoist Co.

426 Schuyler Ave., Montour Falls, N.Y.

New York
Boston
Detroit

Chicago
Baltimore
Melbourne

Philadelphia
San Francisco
Montreal

Pittsburgh
Cleveland
London

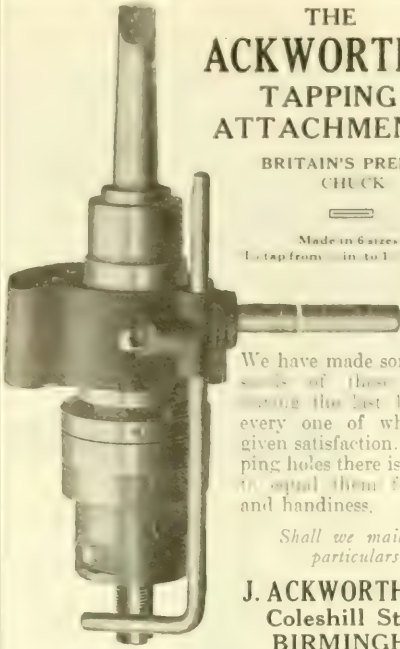
Member Electric Hoist Manufacturers' Assn.

Canadian Representatives: RUDEL-BELNAP, Montreal

THE ACKWORTHIE TAPPING ATTACHMENT.

BRITAIN'S PREMIER
CHUCK

Made in 6 sizes—
Tap from 1/8" to 1 1/2" in Whit.



We have made some thousands of these Chucks during the last 11 years every one of which has given satisfaction. For tapping holes there is nothing to equal them for speed and handiness.

Shall we mail you particulars?

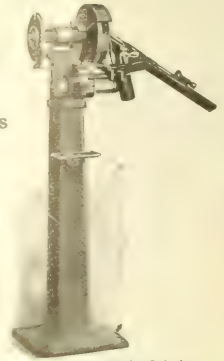
J. ACKWORTHIE, Ltd.
Coleshill Street,
BIRMINGHAM

LA SALLE

**Has an Advantage
Over Other Grinders**

There is some outstanding feature of all La Salle Grinding Machines that lends it exceptional productive ability.

The American Drill Grinder is especially adaptable for grinding twist, flat and three-lipped drills, because it has automatic lip rest and caliper jaw device, which assures proper clearance on all sizes of drills automatically. Send for descriptive matter covering our entire line of grinding machinery.



American Drill Grinder
For Wet or Dry Drill Grinding
1/8" to 2 1/4". Also
1/8" to 3 1/2" dia.

LA SALLE TOOL CO.

La Salle, Illinois, U.S.A.

Represented in Canada by

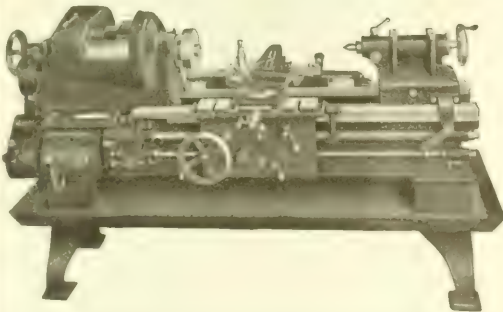
A. R. Williams Machinery Co., Ltd.

64-66 Front Street W., Toronto

Halifax St. John, N.B. Montreal Winnipeg Vancouver

"LEHMANN LATHES"

**Will Put the Same Degree of Efficiency Into
Your Shops as They Have in Many Others**



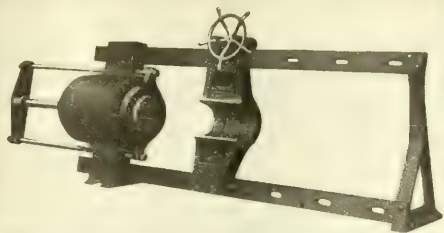
TWO SIZES—16", Swing 18 1/4" and 18", Swing 20 1/4"

Because they are constructed "right" of the best material, workmanship and design, and therefore are adaptable to all conditions, whether it be work requiring accuracy to the highest standards or for the heavy duty where power, strength and rigidity are required.

Convince yourself of these facts! Let us send you complete specifications of this superior lathe and the names of some of the larger concerns who are using "LEHMANN LATHES" for better results.

We know you are interested, so don't put off writing us. Do it to-day. Now!

LEHMANN MACHINE COMPANY, 3566 CHOUTEAU AVE.
ST. LOUIS, U.S.A.



PERRIN 400-Ton Hydraulic Wheel Press

This Made-in-Canada Press is built to operate direct from Accumulator at 1500 pounds per square inch pressure.

Perrin for Reliability

WILLIAM R. PERRIN, LIMITED
TORONTO

WHY EXPERIMENT ?
WE DID IT FOR YOU YEARS AGO



IMPERIAL GENUINE

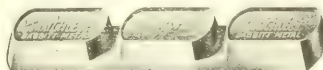


For Heavy Engines and
Extraordinary Hard Work

**HARRIS HEAVY
PRESSURE**

THE
COPPER COATED
CAKE

For Donkey Engines, Saw Carriages, Small Motors,
Transmission Line Shafting and all steady heavy
pressure duty.



Matchless

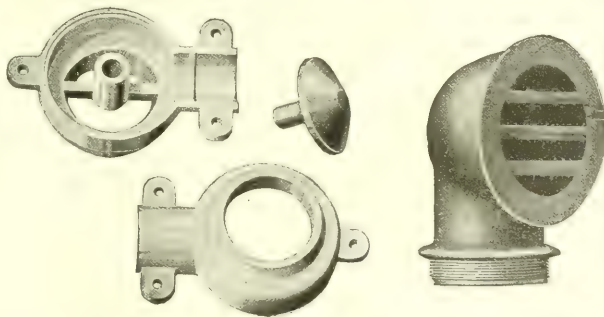
Suitable For Slow-Moving Bearings

Write For Prices

THE CANADA METAL CO., LIMITED
TORONTO HAMILTON WINNIPEG VANCOUVER MONTREAL

DIE - CASTINGS

**DOEHLER
PROCESS**



**MADE
IN
CANADA**

Note the smooth appearance of the Die-Castings in the illustration. No burrs—no rough spots. Cored holes are perfectly round and centred. Require practically no machining

SEND BLUE PRINTS TO US FOR ESTIMATES

Manufactured by

Tallman Brass & Metal Limited
HAMILTON, ONT.



THE SIGNIFICANCE TO YOU OF THE MEMBERSHIP OF CANADIAN MACHINERY IN THE ASSOCIATED BUSINESS PAPERS, INC.

YOU depend upon Canadian Machinery for an unbiased and accurate report of all news affecting your business interests.

Probably, too, you give heed to its editorial counsel in many matters of considerable consequence. You have a right, therefore, to know about the policies and principles back of the important service rendered by Canadian Machinery.

The membership of this publication in The Associated Business Papers, Inc., means that it has achieved an exceptionally high publishing standard, and has subscribed unreservedly to these—

STANDARDS OF PRACTICE

The publisher of a business paper should dedicate his best efforts to the cause of Business and Social Service, and to this end should pledge himself—

1. To consider, first, the interests of the subscriber.
2. To subscribe to and work for truth and honesty in all departments.
3. To eliminate, in so far as possible, his personal opinions from his news columns, but to be a leader of thought in his editorial columns, and to make his criticisms constructive.
4. To refuse to publish "puffs," free reading notices or paid "write-ups"; to keep his reading columns independent of advertising considerations, and to measure all news by this standard: "Is it real news?"

5. To decline any advertisement which has a tendency to mislead or which does not conform to business integrity.
6. To solicit subscriptions and advertising solely upon the merits of the publication.
7. To supply advertisers with full information regarding character and extent of circulation, including detailed circulation statements, subject to proper and authentic verification.
8. To co-operate with all organizations and individuals engaged in creative advertising work.
9. To avoid unfair competition.
10. To determine what is the highest and largest function of the field which he serves, and then to strive in every legitimate way to promote that function.

If you have read the foregoing standards, there is not much left to be said, except to tell you that these principles are *present day realities* and not merely beautiful ideals for future attainment.

THE ASSOCIATED BUSINESS PAPERS, INC.

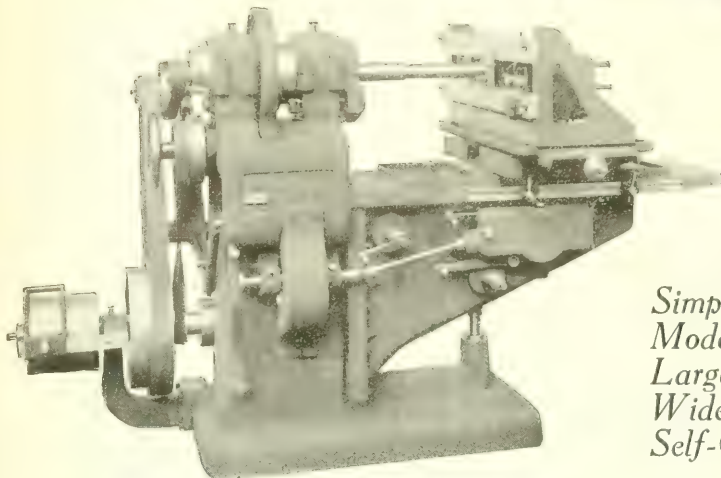
The International Association of Trade, Technical and Class Publications

220 WEST 42nd STREET

NEW YORK CITY



Have You Ever Considered The Cylinder Regrinding Business?



**Heald
Style No. 55**

*Simple
Moderate Price
Large Capacity
Wide Range
Self-Contained*

Notice how well a Style No. 55 supports a six cylinder casting.

If you have ever contemplated going into the regrinding business you have undoubtedly considered a Heald Machine. Possibly you felt it was a little more than you could carry financially, but listen to this—

Our latest style No. 55 has all the advantages of the old machine for regrinding purposes, but we are able to sell it at a reduced price.

How did we do it?

Not by reducing the Heald quality. No, indeed. That is against the Heald policy, but we have eliminated the feed boxes and expensive units so necessary in a manufacturing machine and substituted a driving unit which furnishes power for the speeds and feeds, also making it self-contained.

Then again we have made it wider, to better support large castings, and also increased the capacity by a greater distance between the tables and the grinding circle.

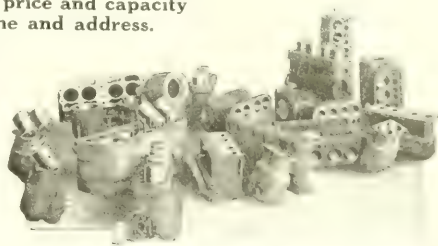
There are a number of things we would like to tell you in addition to the price and capacity if you will give us your name and address.

The Heald Machine Co.

51 New Bond St.

WORCESTER, MASS., U.S.A.

BRANCH OFFICES: New York, 329 Singer Bldg.; Philadelphia, 1302 Stephen Girard Bldg.; Chicago, 26 South Jefferson St.; Detroit, 401 Marquette Bldg.; Cincinnati, 311 Provident Bank Bldg.; Cleveland, 721 Engineers' Bldg.; Buffalo, 331 Jewett Ave. WESTERN AGENTS: Eccles & Smith Co., Los Angeles, San Francisco, Seattle and Portland; Salt Lake Hardware Co., Utah and Idaho; Henzies & Rothloff Mfg. & Supply Co., Denver, Colo.



One machine handles all sizes and shapes of cylinders.



If interested tear out this page and place with letters to be answered.



Sheet Brass Working

This "BLISS" No. 11½ Toggle Drawing Press is one of the many "BLISS" Presses used by the Simmons Company to achieve fine results in making brass beds. It is shown here blanking and drawing bedpost necks from .035" strip brass 9" wide. The shells are 5¾" diameter x 2¼" deep.



1857

E. W. Bliss Company

Main Offices: BROOKLYN, N.Y., U.S.A.

American Factories: BROOKLYN, N.Y.; HASTINGS, MICH.; CLEVELAND, O.; SALEM, O.

SALES OFFICES

CHICAGO, Des Moines, Colo. Bldg. DETROIT, Dime Bank Bldg. CLEVELAND, Union Bank Bldg.
CINCINNATI, 3rd & Vine Bldg. BUFFALO, Marine Bank Bldg. ST. LOUIS, Business Bank Bldg. PITTSBURGH, Keenan Bldg.

— FOREIGN SALES OFFICES and FACTORIES —

LONDON, ENGLAND, Pockock Street, Blackfriars Road, S.E.

PARIS, FRANCE, 100 Boulevard Victor-Hugo, St. Ouen



1921

Bilton

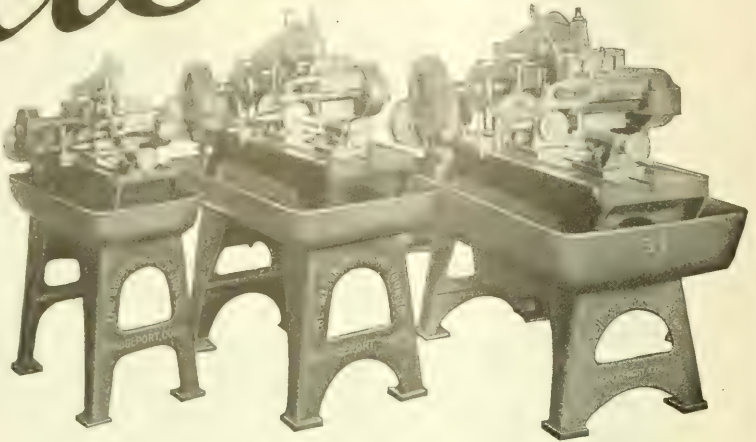
GEAR MILLERS

Fully Automatic

Their adaptability is almost unlimited in small work—such as cutting spur, bevel, miter, angle gears, saws, ratchets, sprockets, cutters, knurls, taps, cylinders, form cutting, manufacturing, milling, etc.

A big time saver, as indexing takes place during return stroke of cutter—which is removing metal 90% of the time.

Write us for Catalog 30-8



Over 500 leading manufacturers now use the Bilton for high production on accurate work

Bilton Machine Tool Co. Housatonic Avenue **Bridgeport, Conn., U.S.A.**

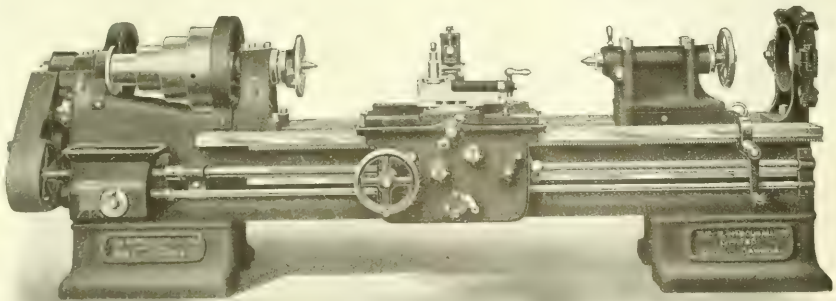
Foreign Agents: Alfred Herbert, Ltd.

Chas. Churchill & Co., Ltd.

EXPERT Workmanship

IS MUCH IN EVIDENCE
IN THE
CONSTRUCTION OF

McDOUGALL Engine Lathes



No pains are spared in the construction of this machine to make its accuracy and finish consistent with its perfect design.

McDougall Engine Lathes possess all the features which ensure economical production, dependable accuracy, and ease of operation.

Shall we send you our literature describing this lathe in detail?

THE R. McDOUGALL COMPANY, LIMITED, GALT, ONTARIO

The Canadian Fairbanks-Morse Co., Limited, Sales Agents

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.



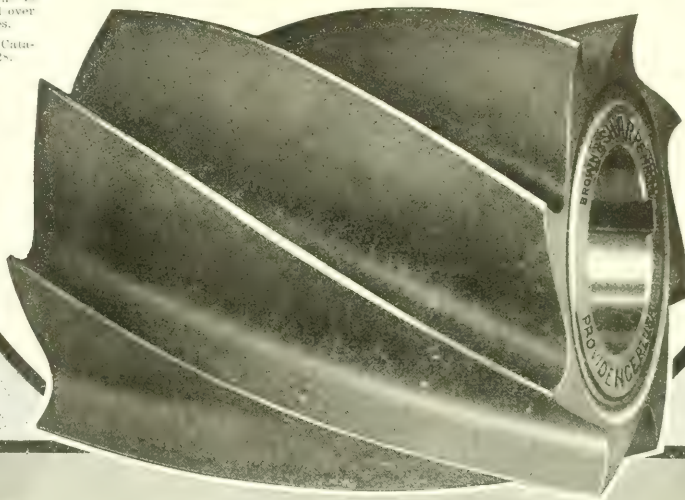
*Specify
B & S Cutters*

**"For Increased
Production and
Lowered Operating Costs"**

They stand the drive of the busy shop, thereby enabling you to utilize the full power of your machines.

Brown & Sharpe Standard Cutters are regularly made in 15 styles and over 2,000 sizes. Send for Catalog No. 25.

Brown & Sharpe Mfg. Co.
Providence, R.I. U.S.A.



**BROWN & SHARPE
CUTTERS**

Refinements in grinding methods enable the manufacturers of small tools to achieve a desirable accuracy of the product.

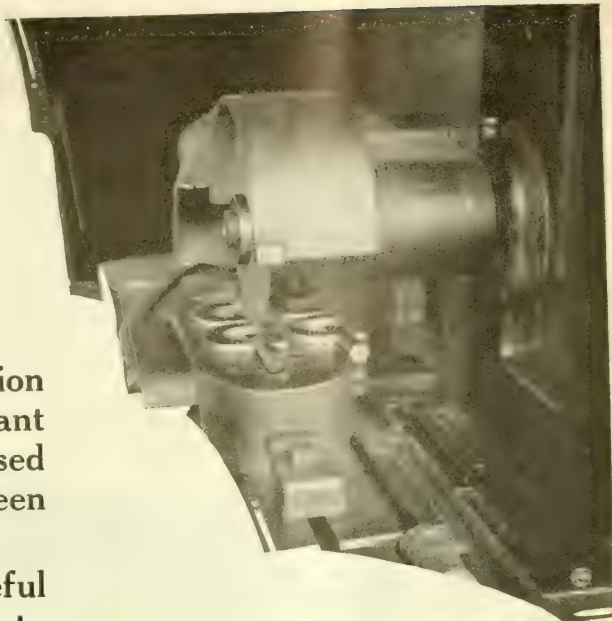
The growth of precision grinding in this important work and the increased scope of grinding has been truly remarkable.

No one making a careful investigation can fail to note the many precision grinding successes made possible by

ALUNDUM

GRINDING WHEELS

Photographs from the plant of the L. S. Starrett Co., Athol, Mass.



Sides of micrometer frames are finished ground on surface grinders equipped with Norton Aluminum Wheels 7 in. diameter by 1/4 in. face.

NORTON COMPANY OF CANADA LIMITED HAMILTON, ONTARIO

Electric Furnace Plants:
Niagara Falls, N.Y.
Chippawa, Ontario

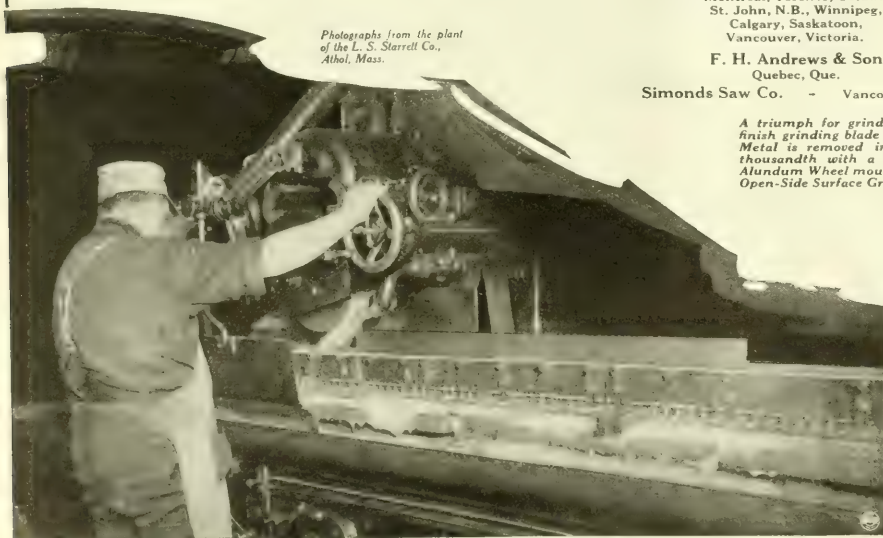
Canadian Agents:
The Canadian Fairbanks-
Morse Co., Limited

Montreal, Toronto, Ottawa
St. John, N.B., Winnipeg,
Calgary, Saskatoon,
Vancouver, Victoria.

F. H. Andrews & Son
Quebec, Que.

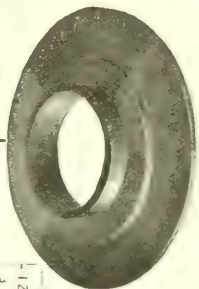
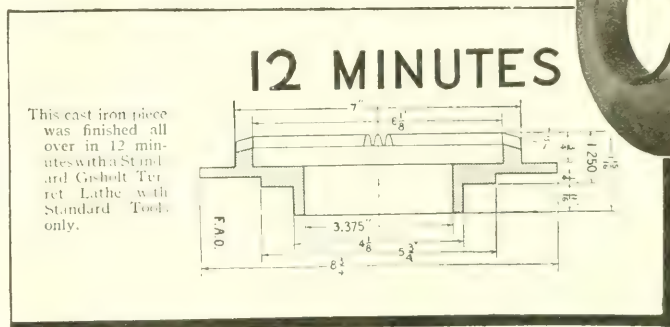
Simonds Saw Co. - Vancouver, B.C.

A triumph for grinding equipment - finish grinding blade for 48 in. square. Metal is removed in fractions of a thousandth with a 38-30 H. Norton Alundum Wheel mounted on a Norton Open-Side Surface Grinder.



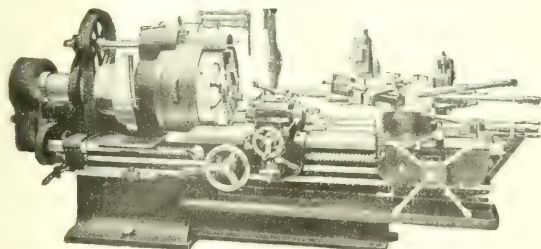
GISHOLT

Compare This Production With What You Are Getting



Consider your time on similar work.

Are you content to keep on doing it your way or will you put it on the Gisholt Standard Turret Lathe?



Standard Gisholt Turret Lathe
Equipped with Standard Chucking Tools

This piece is but one of hundreds of jobs that can be done on Gisholt Lathes, each with its own worth-while saving in time.

The way is open to you to secure greater economy. Why not let a Gisholt Salesman call and explain more fully.

GISHOLT MACHINE CO.,

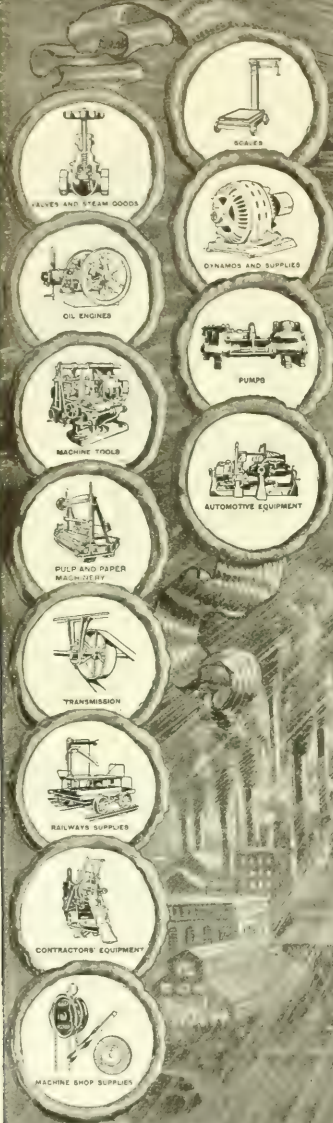
1207 East Washington Ave.
MADISON, WIS., U.S.A.

Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery, etc.
Eastern Sales Office: 30 Church St., New York. Works: Madison, Wis.; Warren, Pa.
Agent: F. A. Thomas Co., San Francisco, Calif.

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria

If not rested here cut this page and place with letters to be answered.

FAIRBANKS-MORSE



A National Institution of Mechanical Service

IN Canada, as in every country in the world, there are names which, through years of service, have warranted national confidence and good-will. In the Canadian world of mechanical and engineering efficiency there is one name which enjoys the distinction of leadership. Its prestige carries through the entire coast-to-coast chain of sales offices and warehouses into every city, town, and hamlet.

Fairbanks-Morse products mark the farmer, the manufacturer, the artisan, and all users as careful and practical buyers of mechanical goods. The Fairbanks-Morse 100% quality seal is the buying guide for the consumer—the guarantee of satisfaction.

The Canadian Fairbanks-Morse general catalogue is a reference of what is standard in design and practice in mechanical goods. This book lists the largest variety of scales, valves, steam goods, oil engines, pumps, electrical machinery, machine tools, wood-working machinery, transmission appliances, railway contractor's and machine shop supplies ever published in Canada in one book. Your copy will be sent on request.

The Canadian Fairbanks-Morse Co., Limited

Halifax, St. John, Quebec, Montreal, Ottawa, Toronto,
Hamilton, St. Catharines, Windsor, Winnipeg, Regina,
Saskatoon, Calgary, Vancouver, Victoria. **1**

Canada's Departmental House
for Mechanical Goods

VOL. XXV. No. 7

February 17, 1921

Proper Methods of Chucking—Holding Work by Special Jaws—Angle Plate Fixture—Cradle Fixture, and Varied Indexing Fixtures.

By A. H. Lloyd, B.Sc., M.B.E.



MUCH as the people who existed against capstan lathes and turret lathes in their early days was probably due to a fear that when the lathes were installed the results would fall short of expectations, due to lack of proper tool equipment. To be dependent on the machine tool maker for special tools for each and every job which came along was not altogether a desirable position, yet many firms hesitated to take the obvious course of

departments of their own. The war swept away all this prejudice by force of circumstances. Enormous numbers of turret lathes came into being, and many users were compelled to tool up the machines themselves owing to the inability of the makers to meet the demand. In doing so they gained confidence in their ability to get the best

with the result that turret lathe tool design is now accepted as a scientific subject of great importance and is given considerable attention in the technical press.

Realizing some of the difficulties of turret lathe users when production was of such importance, the firm with which the authors were previously associated called "How to Lay-out Turret Lathe Tools" a book in 1940. The purpose of this book was to enunciate certain broad principles of

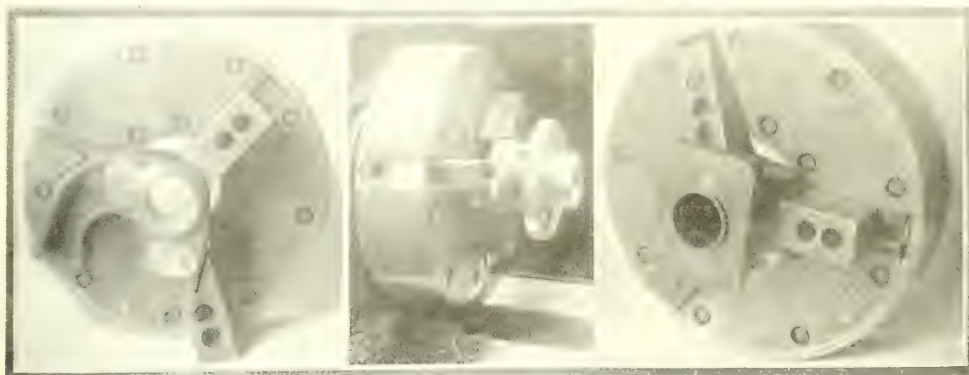


FIG. 5 EXTREME LEFT VIEW. SPECIAL JAWS FOR ROLLER FEED BOX TOOL FRONT PLATE.
FIG. 6 CENTER VIEW. SPECIAL JAWS FOR OVAL T. ANGLE.
FIG. 7 RIGHT HAND VIEW. SPECIAL JAWS FOR BORING BAR HOLDER.

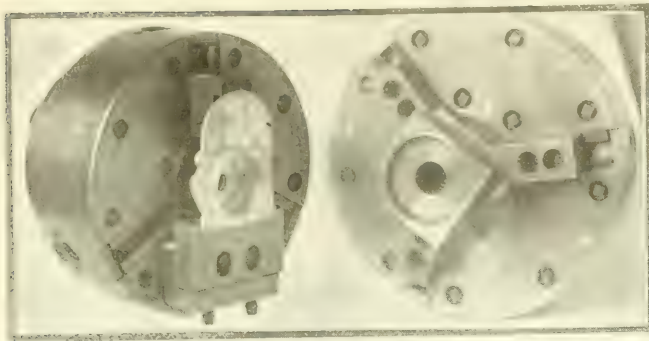


FIG. 6. LEFT HAND VIEW. ONE JAW METHOD OF HOLDING MAGNETO END PLATE.
RIGHT HAND VIEW. SPECIAL SOFT JAWS FOR HOLDING SQUARE TURRET BLOCKS

turret lathe tool design and practice which, if adhered to, would enable anyone with a fair shop experience to undertake this work with a reasonable assurance of success. In this article I propose to approach the subject by giving a number of examples of modern turret lathe lay-outs, from the description of which we shall, I hope, be able to extract some information of interest and value. In doing so I shall exclude consideration of hexagon turret lathes for producing articles from the bar, as this type of lathe is always equipped with a very complete outfit of tools which enables it to handle all ordinary work within its capacity without the use of special tools.

Two Viewpoints

Every turret lathe job has to be considered from two points of view, namely, chucking and tooling. The chucking often gets insufficient consideration, and one sees an otherwise good lay-out of tools spoiled by inefficient chucking. First let us consider some examples of chucking in the "Coventry" concentric chuck, which possesses great gripping power, and adaptability to irregular objects by the use of special jaws.

At Fig. 1 is shown a set of special jaws for holding a drop forging, which is the front plate of a roller steady box-tool. The machining operations consist of drilling, boring, facing, and the interest lies entirely in the method of chucking. One jaw grips the boss whilst the second, which is of vee block form, engages the corner and positions this correctly, whilst the third jaw grips behind the boss on the top side of the stamping. This piece would have been a very awkward one to handle in the ordinary way, but with the special jaws correctly fixed in position, chucking is as simple as in the case of an ordinary circular object. In order to facilitate putting special jaws in the correct position on the jaw slides, it is good practice, after they have been once set up and adjusted to a sample stamping, to mark lines on the sides of the jaws, which register the position in rela-

tion to one of the rings on the face of the chuck.

In dealing with pieces of work like stuffing boxes, glands, and similar articles, one is often faced with the necessity of requiring the chuck jaws to

This article, which is the first of a series, is written by an authority on this class of work. As he so aptly remarks in the present portion "The chucking often gets insufficient consideration, and one sees an otherwise good layout of tools spoiled."

The various fixtures shown can equally be applied to other similar shaped parts, so that readers would do well to more than lightly consider the examples depicted. We believe this series will be filed away by many readers for future reference, and each will be complete in itself. The next portion will appear March 24th, and will go into tool layouts of various kinds.

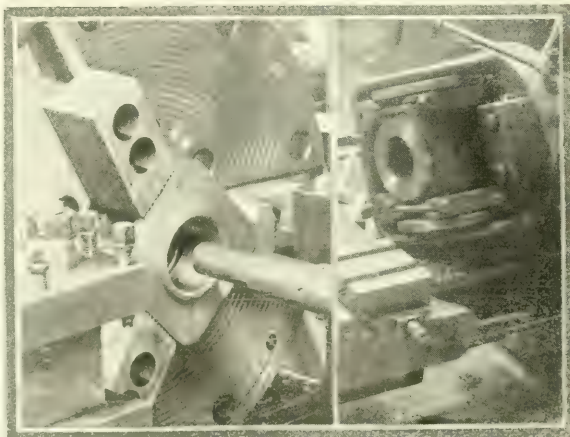
grip on an oval flange. This has usually been looked upon as legitimate work for a two-jaw concentric chuck or a four-jaw independent chuck. Those who have had experience of two-jaw chucks, however, know that they are usually short of gripping power, which of course makes it difficult to get the best out of the tooling. On the other hand, four-jaw chucks, whilst having plenty of gripping power, are, to my mind, not so quick and sure to operate as the concentric chuck. By designing special jaws, oval flanges can be held in the manner shown in the next slide. One jaw grips across the minor axis of the oval, whilst the two remaining jaws are bevelled off symmetrically and form a centralizing vee.

In equipping Herbert combination turret lathes and capstan lathes we manufacture large numbers of boring bar holders, which are made from iron castings. These are bored and faced on auto lathes, and at one time the castings were chucked in cradle fixtures. Subsequently the question of gripping them in the concentric chuck was considered, with the result that the set of jaws shown at Fig. 3 was designed.

Two of the jaws are made from standard bar jaws tapered to suit the casting, the third jaw is made from a standard soft jaw blank, in which a traverse vee is machined for locating and gripping on the pad bolt boss. It is not difficult to imagine that this method is much quicker than the fixture method of holding, and in addition has the advantage that it ensures concentricity of the hole with the outside of the casting, since the arrangement is self-centering despite slight variations in the castings.

The One Jaw Method

A special method of chucking which is often very helpful to tool designers is known as the "one-jaw" method, an



LEFT HAND VIEW, FIG. 5. SHOWING SPECIAL JAWS FOR HOLDING SQUARE PIPE FLANGE.
RIGHT HAND VIEW, FIG. 8. SHOWING SPECIAL FIXTURE FOR HOLDING GLOBE VALVES.

example of which is shown at Fig. 4. The work is an aluminum die casting, the end shield of a motor-cycle magneto. This piece cannot be satisfactorily gripped with three jaws on the boss, as it is of a peculiar shape, and moreover, gripping at such a point would be liable to distort the finished hole. In the method of chucking shown, the gripping is done by a single jaw against an adjustable locating block bolted to the face of the chuck, the two other jaws being removed. The locating block is made in two parts, the upper portion being adjustable inwards by two set screws which facilitate setting up true. When adjusted to the casting the locating block is clamped up by means of two collar screws.

Holding square objects in the "Conventry" chuck is as easy as holding oval flanges, as will be seen at Fig. 5. The article in the chuck is a steel pipe flange which has to be bored, faced and tapped. One standard jaw grips on a corner, whilst the two remaining jaws are bevelled off to a suitable angle. In this case the jaws are gripping on an unmachined surface, but the same method is applicable to finished work.

Fig. 6 illustrates how we use it in our own practice for boring and facing the square turrets of our lathes. In producing these parts the steel bars are milled in lengths, afterwards being cut up and milled on the remaining sides, the lathe operation being the last. It is therefore very important that the lathe work should be concentric with the previous machining, and the method of chucking adopted gives the required degree of accuracy.

The Use of Fixtures

The preceding examples may be regarded as typical of work which can

be held in a concentric chuck, and we may now consider the question of fixtures. You will appreciate that this is a subject of which we can only touch the fringe, and we will merely consider what are the desirable features to be aimed at in fixture design. They should, of course, be designed with as little overhang as possible, so as to make the work rigid under heavy cuts; they should be accurately balanced to avoid vibration at high speeds; they should be as light as is consistent with ample strength; the means of clamping should be rapid and secure.

Broadly, fixtures can be divided into two types, namely, those in which the work is located from an unmachined surface, and those in which it is located from a surface machined at a previous operation. An instance of work located from an unmachined surface is shown at Fig. 7. The fixture shown was designed for holding water-cooled cylinders of a "Lister" engine during the bor-

ing operation, which is done on one of our No. 9 combination turret lathes. At first sight it might appear that this piece could be held in a concentric chuck by designing special jaws, but in this particular instance the fixture is better practice.

Gripping with jaws would, in all probability, crack the water jacket, and, in addition, the work would overhang so far from the chuck that it would not be possible to turn the skirt at the same time as boring. The casting is located in the fixture on four adjustable set screws which form a vee, and is clamped against this by two more set screws carried in a strap bridging across the fixture. The strap is made in two parts which are hinged about pins in the sides of the fixture. The hinges are jointed together in the centre where they overlap, by a hardened pin which is a push fit through the two parts of the strap. When removing the casting from the fixture, the two clamping screws are loosened, and the central pin withdrawn, thus allowing the two portions of the strap to be swung clear of the work. This method of clamping is rapid, as the strap, being made in two hinged parts, is easier to manipulate than the conventional single piece strap.

Fig. 8 depicts a special fixture for holding globe valves on a No. 9 combination turret lathe during the machining operation on the centre hole and flange. The casting is drawn down on to two vee blocks shaped to suit the shoulders of the valve casting by means of straps clamped by swivel bolts. One nut only is required to clamp each strap, as the bolts at the rear are hinged to the straps. When chucking or unchucking, the straps are swung clear of the work and retained in position by two pins carried in the balancer weight. The locating blocks and clamps are made to slide, so that the same fixture may be made to accommodate various sizes of valve.

At Fig. 9 is shown an angle plate fixture for holding a carburetor body. In this case the location is obtained from the float chamber which has been

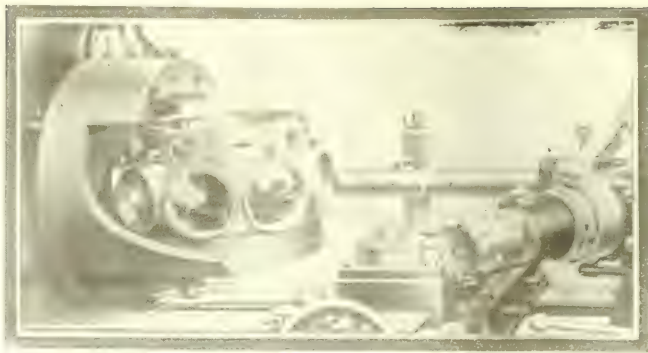


FIG. 7 INDEXING FIXTURE FOR WATER-COOLING CYLINDER

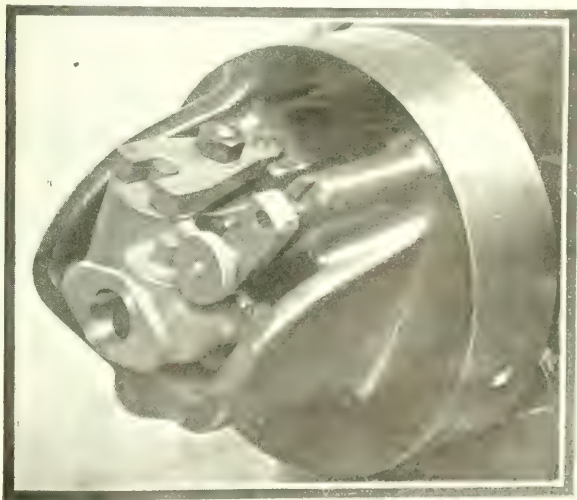


FIG. 9 ANGLE PLATE FIXTURE FOR CARBURETOR BODIES

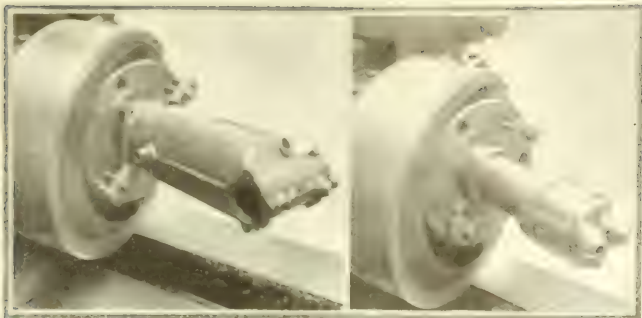


FIG. 10. INDEXING FIXTURE FOR LE RHOSE ENGINES. LEFT: SIDE VIEW. RIGHT: FRONT VIEW.

The indexing fixture is designed to hold the casting in position so that when the nut is released sufficiently to allow the casting to be raised from the spigot, it can be taken straight out. The other clamp is operated by a knurled nut, and serves to swing the casting around to an adjustable locating point at the rear. A partial turn of the nut is sufficient to allow the clamp to be slid out of the way and allow the casting to be removed from the fixture.

Indexing Fixtures

We cannot leave the question of fixtures without discussing indexing fixtures. A very good example is depicted at Fig. 10. This shows an operation on the crankcase of the "Le Rhone" rotary engines. In this engine the cylinders are radially disposed round the crankcase, and are secured in position by screwing them down into their seating. The operations consist of boring, bossing, facing and screwing, and

in connection with the latter operation it is necessary for the thread to start from the same point on all holes, so that the cylinders screw down into alignment with the valve tappet mechanism. The work was done on a No. 2 combination turret lathe, and the indexing fixture was designed by Messrs. W. H. Allen of Bedford. In the fixture is a central pillar bored out and fitted with a steady bush which serves to pilot the boring bars used at this operation. The screwing is done with a Coventry collapsing tap which is started by connecting it to the chasing saddle. This fixture provided a boldly conceived method of doing an unusual job in a rapid manner.

The peculiar indexing fixture shown at Fig. 11 was designed to hold the cylinders of the Rolls-Royce "Eagle" engine whilst boring the valve holes in the head. The work is located by an expanding peg and is also clamped down on a faceplate. In the flange of the cylinder there are two accurately spaced dowel holes of unequal diameter which locate the cylinder on the crankcase. The small-

er of these two holes is utilized to locate the cylinder in the first position on the fixture by means of a dowel on the faceplate. When the first hole has been bored, the clamps are swivelled out of position (as shown in the view of the fixture with the cylinder removed), the expanding peg is released, and the cylinder rotated by hand through approximately 180 deg. The actual location for the second hole is done by pushing a hardened plug through the finished valve hole, thus lining it up with a locating hole at the front of the fixture. When in the second position, the dowel is in the large hole, so that it does not influence the location.

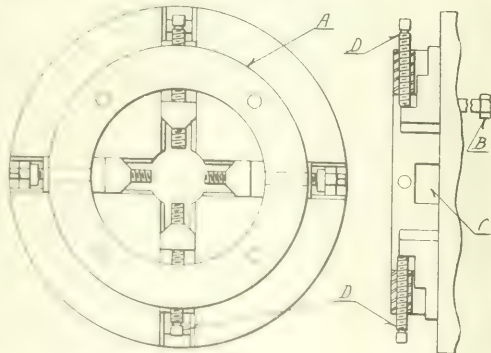
HEAT TREATMENT OF STEEL

According to Scientific Paper No. 395 of the U.S. Bureau of Standards, the experimental results obtained by the Bureau regarding the relation of high temperature treatment of high-speed steel to secondary hardening and red hardness appear to warrant the following conclusions: (1) Secondary hardening necessitates prior partial austenitization produced by the high-temperature treatment; (2) the variations with heat treatment in physical properties and microstructure of high-speed steel are analogous to those of hypereutectoid carbon steel with the exception of the microstructure of hardened but untempered steel; (3) red hardness is largely a function of the composition of the matrix, and is only comparatively slightly affected by the amount of dissolved carbide. Three reasons are given for the established advantages derived from the use of the high-temperature heat treatment—namely, increased red hardness, increased initial hardness, and reduced brittleness.

Increasing Grip on the Work

Chuck jaws after long service become worn owing to the frequent gripping of work on the extreme end. When working on heavy jobs the grip seldom takes place along the entire jaw, the result being loss of rigidity and tool troubles. To remedy this on a particular job some time ago we had recourse to the idea here shown.

A ring A of suitable size was faced on one side and slotted at four points for jaw clearance C, and secured to the chuck face by four bolts B. Immediately over each jaw a screw D was located so that the "slack" could be taken up and the necessary pressure applied to give a parallel and firm grip.



One Method of Producing Steel Barrels

Importance of Steel Used in Manufacture—Press Operators—
Two Styles of Reinforcement, Rolled on Body, and Separate Hoop
—The Detection of Leaks—System of Galvanizing.

By J. H. MOORE

THE relatively short life of wooden barrels, together with the steadily increasing cost of wood suitable for barrel making, has, within the last few years, greatly increased the popularity of the steel barrel. Experience has proven that steel barrels are unusually well suited for many classes of service, and although various concerns may turn out a similar product in an entirely different manner, the sequence of operations are of rather standard style. We make this explanation so that it may be quite clear that we are not telling "How to make steel barrels," so much as we are narrating the method employed by the W. D. Beath, Ltd., Toronto, Canada. This concern has been producing steel barrels of different sizes for some considerable period, and have embodied the very best practice obtainable through such experience.

The Steel Used

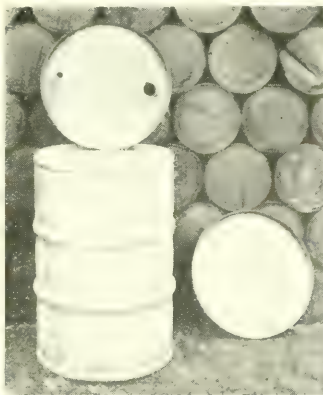
Hot rolled steel is, as a general rule, used for making steel barrels, and three pieces of steel are required to complete a barrel. When we say three pieces, we do not infer that there are only three pieces to a barrel, but what we mean is this, that there are three main pieces, namely, the body, and the two heads, sometimes called the top and bottom. As a rule the body material is made from 13-gauge stock, and the heads from 12-gauge material.

The raw material arrives at the plant in sheets of such size that those used for body making only require a slight amount of trimming under a squaring shear. The sheets from which the heads are drawn are usually made in a size that allows the blanking and drawing of three heads. This style of sheet is easy to handle, and economical. The chemical composition of barrel steel is per-

haps the most important factor in successful barrel making. Poor steel means endless trouble, in the shape of faulty seams, cracks and so on. For this reason the concern we speak of are very particular regarding the stock they use.

Making a Barrel

Let us suppose we are going to watch the making of a barrel, right from the raw stock to the finished product, the



THIS VIEW SHOWS A TYPICAL EXAMPLE OF BARREL, TOGETHER WITH A SEPARATE TOP AND BOTTOM

barrel being of the galvanized variety. We shall commence with the body, digressing when necessary to the making of the heads.

The raw material for the body comes from the stock room in sheets, as already described, that require only a slight trimming on the squaring shear. After squaring they go through what is termed the first rolls, and there they

are rolled, after which they are seamed by a welding torch as shown in the photograph. A complete line of these torches and welding stands are installed and the line presents a very busy appearance indeed. After the seams are welded, the partially completed barrel takes various steps, depending on its nature.

For example, two types of barrels are made, the reinforced type of barrel, with a steel hoop placed near the top and bottom, and the type which has merely a reinforcement rolled in the body stock itself. The former type is, of course, the stronger, but for some purposes the latter is just as good, and is less expensive.

Should the barrel be of the reinforced steel hoop type, here is what happens. The rolling hoops, as they are called, which are made from flat stock, are rolled, then welded. They are next placed over the body of barrel in correct position, and go into an expanding machine which presses out the stock, gripping the reinforced hoop securely. Later, a band header raises a bead on the body, partially around the reinforced hoop, this making everything secure. On barrels that have no reinforced rolling hoops, the form of reinforcement is rolled on the body itself by means of a suitably formed pair of rolls.

Leaving the bodies for a short time, let us discover how the heads are made. As stated before, three heads are cut from one sheet, and these are cut out on a circular cutting machine. They are next embossed and lettered on a huge Toledo press, and a word of detail regarding this set of dies would not be amiss.

It is no doubt already well known that in turning out barrels such as this, it is necessary that every barrel have a number. The name of the firm for whom



LEFT HAND VIEW SHOWS A PORTION OF GALVANIZING ROOM. RIGHT HAND VIEW DEPICTS THE MAKING OF A BARREL HEAD ON THE PRESS.

the upper and lower heads are also usually continued on the body, and it is for this purpose that the die about to be explained is made.

The design for the design of these heads is usually obtained from the body, as shown in Appendix, illustrating type for printing. These dies have, however, an advantage over ordinary type inasmuch as they can be used over and over again in various combinations and produce any desired marking on the work. It will be apparent from the photograph shown just what style of marking is accomplished. The dies consist of steel blocks, one of which carries a number or letter of the desired size. These die sections are made in pairs, one letter, or figure, being in relief, while the other is cut into the face of the die block. One stroke of the press, of course, completes the impression on the head, which appears in relief.

The heads are next placed on another similar Toledo press, and a flange of about 1½-inch depth all around is drawn, this being for the bottom only. The top heads are of slightly different construction, and have a raised portion on the same, also two holes are punched on this piece. The photograph accompanying the text illustrates clearly the construction of both heads. The nipples are now welded to the top heads on special stands.

Assembling Barrels

The heads are next inserted into the body, a special reinforcing ring is placed at the same portion, after which they are rolled into place on a vertical seam rolling machine. Following this seam rolling operation, the edges around both the top and bottom are welded. This operation is also shown by photograph.

This practically completes the barrel with exception of testing, and this operation is performed in the following manner: Every barrel is tested to 15 or 20 pounds pressure, and compressed air is used. To detect leaks, if any, soapy water is used, and, of course, should



WORK AT WORK WELDING THE SEAM AT TOP OF A BARREL.

there be a leak it soon bubbles up. Having been tested, and taking it for granted that the barrel has to be galvanized, it is passed on to a cleaning machine, which takes out all dirt from inside of barrel. From here it passes into the galvanizing room, and enters the pickling baths, where it stays from 20 minutes to half an hour at approximately 150 degrees temperature. It next goes to a drying oven and is dried.

The barrel is now ready for galvanizing, and briefly speaking here is how this concern dip their barrels. They have an ingenious carriage idea arranged over their tank, and we have illustrated this by photograph. Placing the barrel on the carriage shown, the operator pushes the same up the incline, over the tank on to hook shown, then dips.

The tank containing the galvanizing

solution has a coke fire all around it, and it is very important that the galvanizing metal be kept at the proper temperature. After galvanizing, the barrels are unloaded from the tank by reverse of process already explained. To take any pieces of scale, or hardened matter, from the inside of barrels, a suction arrangement is used, very similar to an ordinary suction sweeper. This removes all dust or scale in very short order.

Other Operations

Should the barrels be of the painted type, no galvanizing is necessary, and they are dipped in a tank of asphaltum paint, then dried. This concern use a Davis 300-pound capacity acetylene generator, which produces 300 feet of gas hourly. The method of linking up their oxygen cylinders is also worthy of note. The cylinders are linked up in series of 10, and two groups are arranged. All the welding torches are fed from these groups, and as soon as the one group is exhausted the other series is switched over and a new line of cylinders installed to replace the empty ones. In this way there is no delay at any time.

For other classes of work they have a Lincoln electric welder, and the writer viewed a fine example of electrically welded galvanizing tank made by this concern themselves. A notable feature in the making of these barrels is the fact that once the stock is on the move it goes right through with no back motions. By this we mean that the operations are so arranged as to keep the work moving towards the final operation, without any return routine. The heads of barrels go down one side of the plant for a certain distance, while the bodies go down the other side for a like distance. At a certain point they meet and from there the barrel follows the operations already spoken of. Some 500 barrels are completed every nine-hour day.

CHIMNEY TEMPERATURES

An instrument has been produced for ascertaining the temperature of a chimney at various depths. The apparatus consists of three tubes extending to various depths, and enclosed in a long, pointed steel case. These tubes end in bulbs, and are filled with alcohol. At the upper end of the instrument are three dial temperature indicators, each connected to a tube. The scales on the dials range from 32 deg. to about 200 deg. Fah., and are colored black up to 120 deg., but upwards from that temperature the color is red, indicating excessive heats. If several of these devices are forced into a coal pile at varying depths and in different localities, accurate information can be gathered for the whole of the pile. It is stated that instruments employed at intervals of 50 ft. have proved very effective.



A PERSPECTIVE VIEW OF THE BODY SEAM WELDING DEPARTMENT.

Various Clamping Units of the Slip-on Type

By F. Scriber

IN DESIGNING nearly all classes of jig work it is considered advantageous to have the clamping parts arranged for quick removal of the work. Methods of accomplishing this vary considerably and it is the object of this article to describe a number of different types of slotted collars and slotted clamps. Referring to Fig. 1, the illustration at the left shows a clamp which has the hole cut out so as to form a slot. In making this collar it is the usual practice to have the nut which clamps the collar of such a diameter that the work will pass over the nut without removing the same, therefore it is necessary to loosen the nut slightly, when the clamp can be removed by turning the same about its axis, so that work placed under it may be readily removed. This arrangement is often made with both slots cut from the one side.

Fig. 2 shows a round plate A clamped by three nuts B; holes C, suitable to clear these nuts, are drilled in this plate with slots connecting the main bolt holes. Turning this plate about its axis so the

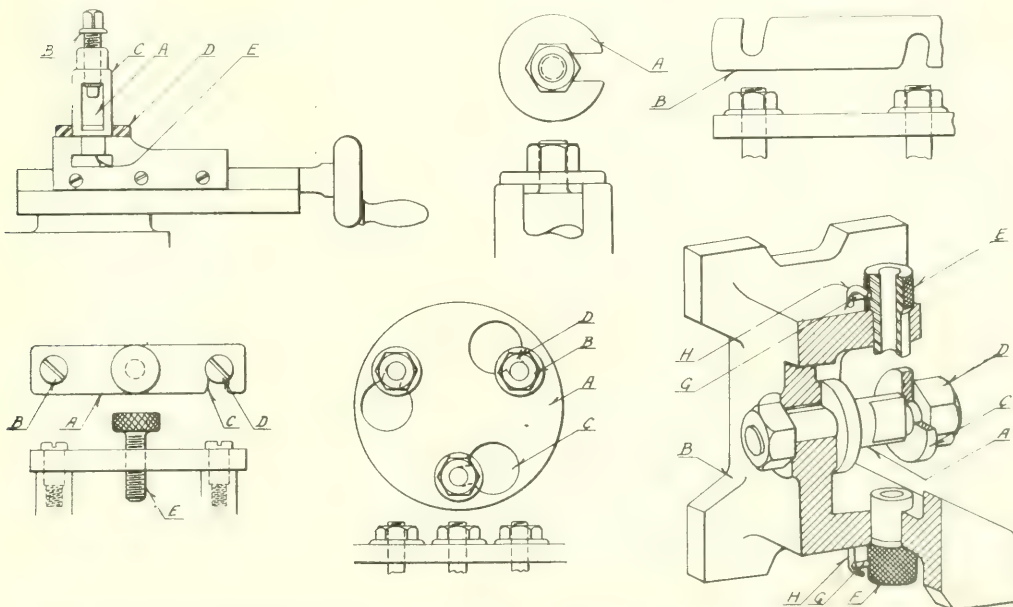
holes will line up with the nuts permits removal of the plate, while turning it so that the nuts are over the slots, as illustrated, places the plate in the clamping position. Circular plates of this type are often made with quite a number of holes and bolts, while they are also made in rectangular and other shapes.

A modification of the design shown in Fig. 1 is illustrated in Fig. 3; this consists of a hinged clamp A, which pivots about a screw B, and when in a clamping position the slot C passes over the head of the screw D. The work placed between these screws is then clamped by the knurled screw E. Various modifications of this design will readily suggest themselves in tool design work.

Fig. 4 is an example of the slip collar principle shown in Fig. 1, as used in a drill jig. In using this tool, work which has a hole in it is slipped over the stud A, this stud being clamped into the jig B, the stud being keyed in place to prevent it from turning. When the work is located on the stud the slip collar C

is put in place in the manner described in Fig. 1, and the nut D tightened to securely hold the work in place. Two slip bushings, E and F, guide the drills used for drilling the work and these slip bushings are prevented from turning by pins G and hooked pins H.

Collar design that is in general use on lathes is shown in Fig. 5. This design can frequently be used to advantage for holding work in jigs, and it is with this object in view that it is here shown. In using this arrangement the object is to place a cutting tool in the opening A, when by tightening the screw B, the post C is pulled up causing the tool to be wedged against the collar D, the other surface which takes the clamping strain being the upper side of the tee-slot E, and as previously mentioned, this adaptation in varied forms can often be employed to solve tool, jig and fixture problems, one modification of this being to have the post itself carried on a hinged pin so it will align itself when clamped.



FIGS. 1 TO 5 INCLUSIVE. FIG. 1. UPPER RIGHT HAND VIEW. TWO CLAMPING METHODS FOR QUICK REMOVAL OF WORK. FIG. 2.—LOWER CENTER, SHOWING SLOTTED DISC FOR REMOVAL OF BOLTS. FIG. 3.—LOWER LEFT HAND VIEW SHOWING SWIVEL COVER, OR SLOTTED PLATE CLAMPING DEVICE. FIG. 4.—LOWER RIGHT HAND VIEW, JIG SHOWING SLOTTED COLLAR CONSTRUCTION. FIG. 5.—UPPER LEFT HAND VIEW. TOOL, CLAMPING COLLAR USED ON LATHES.

Making a Bent Ring Cleat on the Bulldozer

Coiling the Stock—Cutting the Coils Into Rings—Inside Diameter Important, Otherwise Subsequent Die Operations Will be Poor—Light Drop Hammer Used, also Bulldozer.

By S. L. BLOOM

THE accompanying article and illustrations describe the method of making bent ring cleats. The process for the manufacture of a bent ring of 1 1/2 ft. diameter with the final shape and dimensions being those shown in Fig. 1. The straight rods are received in commercial lengths and the first operation is the winding of the rods around a suitable arbor in the form of a spring, which are afterwards cut into rings with the ends overlapping. The coiling of the rod, shown in Fig. 2, is accomplished in a simple winding machine, which consists of a belt-driven head and a cylindrical mandrel, the diameter being slightly less than that desired for the inside of the rings. The end of the rod is driven by a pin in the flange of the head, and the

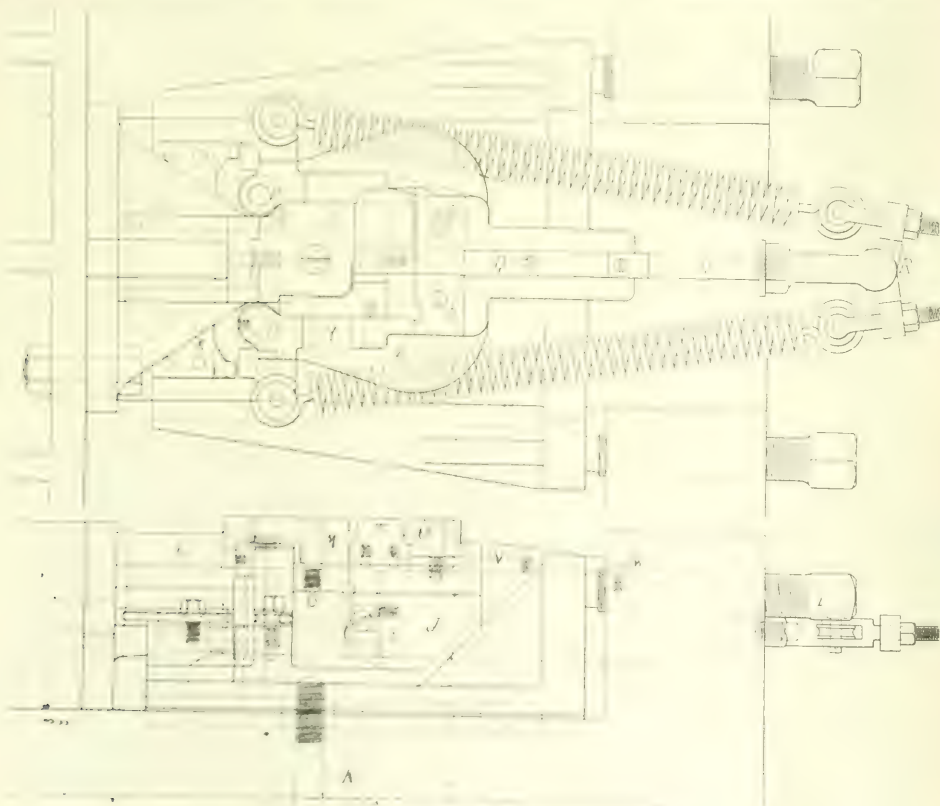
rod is rotated by a geared motor as the machine revolves. The work produced is in the form of a helical spring.

Cutting the coils into rings is performed as shown in Fig. 3, a press being utilized for this purpose. The top shear has its cutting edge inclined at a slight angle to the plane of the coil. The body of the spring is held in the hand of the operator with its axis horizontal, against the face of the block A, fixed to the bottom bolster of the press. This cutting block is shaped to support the coil on the inner circumference, and to suit the free face due to the pitch of the helix. The sheared end of the coil is held against a vertical shoulder on the block, while the descending upper shear blade severs the coil at a point a few degrees beyond the complete circle and

the remaining portion forming the overlap that afterwards is used to make the weld.

It is essential that the inside diameter of the coils be produced to accurate dimensions to insure successful work in the subsequent die operations. Each coil, therefore, is gauged after cutting, by placing on a circular block which is shaped to the inclination of the overlapping end. The operator discards all rings not conforming to the limited tolerance.

The rings are then heated in a furnace, and are then located in a light rope drop hammer fitted with suitable welding dies. The dies are made to envelop about two-thirds of the circle, the remaining third providing a hold for the operator's tongs. The lower die has a small central portion B, which stands



A DETAIL VIEW OF THE FINAL BENDING OPERATION

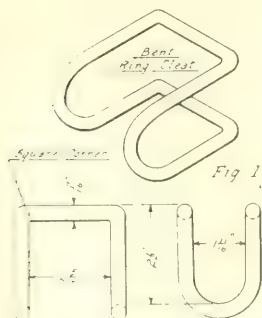


FIG. 1—SHAPE OF PIECE COMPLETED

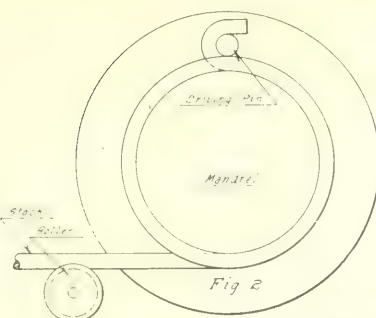


FIG. 2—THE COILING OF THE ROD

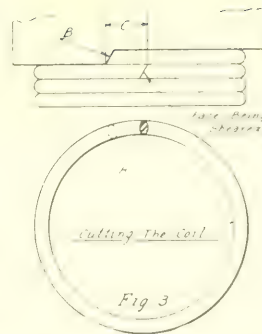


FIG. 3—CUTTING THE COILS INTO RINGS

well above the diameter of the round stock of the ring, so that the ring may readily drop into place against the quarter circle radius at its base. The upper die E is correspondingly recessed, and where the weld F occurs the dies are shaped so as to spread the extra metal over a greater part of the circle than that occupied by the initial lap. The welded ring is now about $4\frac{1}{4}$ inches inside diameter.

Final Operations

The final operations of bending and flattening the ring are performed in a bulldozer fitted with the special two-purpose dies here described. The long horizontal stroke of the bulldozer is particularly adapted to this class of work. The forming dies consist of a moving diehead G, which is bolted to the ram of the machine, and a stationary dieholder and component parts which are clamped across the bed and bear against the end thrust screws L. The moving dies are in two parts: the upper block M designed to press the circular ring into an elongated shape as the first operation. The lower block N forms this elongated ring into the final shape A as the second operation.

The stationary die-holder has a recess O fitted with inserts grooved to envelop the outer faces of the finished piece. At each side of the entrance are guide rollers P, to give an easy bending movement to the yielding piece. In the center of this die-holder a slot is provided for the slide bar Q, the movement of which is controlled by two heavy adjustable tension springs acting on the compensating bridge R, fixed to the end of the bar. The front of the bar carries a clamping die S, which is normally pressed out ahead of the rollers, but which forms part of the forming die when pressed back. On the top of the bar slides is the centering block T, around which the ring is flattened against the stationary piece U, grooved to suit, and forming a tangent to the semi-circular ends of the flattened ring. This block has a stem V that works in a groove under the rear piece U, and the block takes part of the forward

movement of the slide bar by contact of the stem with the projecting lip W. The front part of the stationary die has lugs to which the stripped plates are attached. The stripped fingers run in side grooves of the lower moving die. The rear part of one of the strippers is shaped to serve as a gauge for the flattened ring when inserted for the final operation. The bodies of both die-holders and moving die-head are made of cast iron, and parts coming in contact with the red hot ring are made of high speed steel.

Fig. 6 shows a sketch of the sequence of operations for the forming of the ring. With the moving die-head withdrawn the slide bar Q and clamping die S project ahead of the stationary die, and the centering block is in its forward position. The heated circular ring is placed over this centering block, the clutch tripped and the upper moving die M flattens the ring around the centering as it moves toward the rear block U. When the ram recedes the flattened ring is removed by tongs on its projecting end. The ring is now turned into the

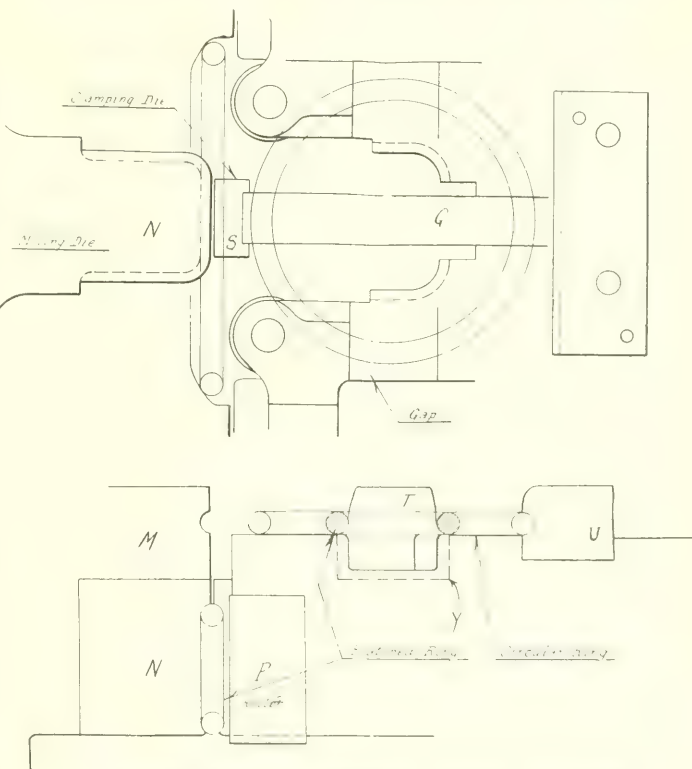
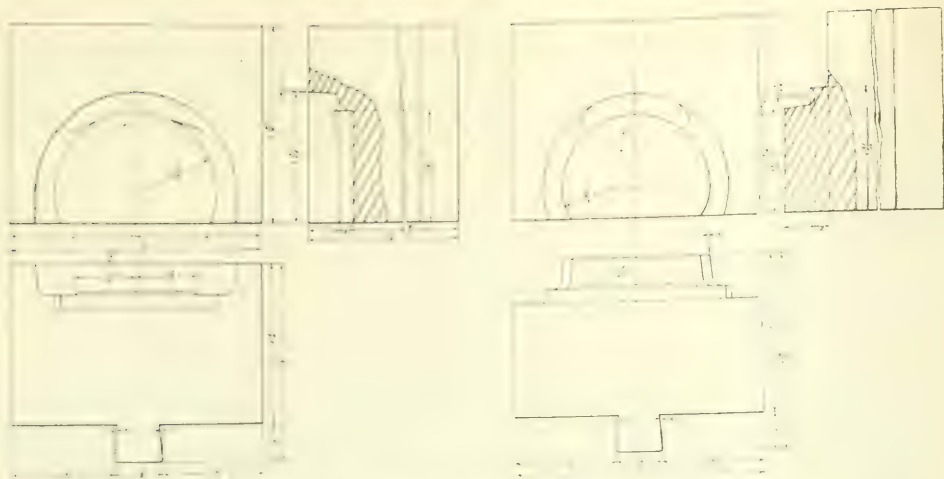


FIG. 6.—SHOWING SEQUENCE OF OPERATIONS IN FORMING OF THE RING.



THE WELDING DIES USED ON THE RING.

vertical plane and set in front of the rollers, the far side against the gauging face of the stripper. The clutch is again released and the lower moving die N advances, gripping the center of the ring against the clamping die S, while the ring is bent around the rollers P and forced into the dies O. As the ram retreats, the clamping die, under the tension of the controlling springs, keeps the bent ring on the moving die until the fingers of the stripper retard the piece and permit it to fall clear on to the sloping flange of the stationary die. The centering block on top is meanwhile advanced to its forward position ready for the following ring to be flattened.

Two rings may be passing through the machine at the same time, but as it is advisable to place the weld so that it will come on the straight portion of the finished work, it is probably more advantageous to make one operation per stroke, as the machine can then be run continuously.

WHY DID IT BREAK?

MANY a steel treater and tool designer has asked himself this question after the failure of some particular part which was being hardened. Sometimes he discovers the trouble, but generally it remains an unsolved mystery.

At a joint meeting of the American society for steel treating, Toronto chapter, and the American society of mechanical engineers, Ontario section, held in Toronto February 11, this subject of breakage was ably discussed by Howard J. Stagg, assistant manager of the Halcob Steel Company, Syracuse, N.Y. His talk was illustrated by lantern slides, and splendid examples of failure, due to various causes, were shown on the screen.

Particular stress was laid on the point of inefficient design, and the mechanical engineers came in for a good natured call down. "Engineers in general," com-

mented Mr. Stagg, "are well aware that sharp cornered keyways, sharp angles and sudden change of section are all to be avoided as far as possible, yet they will persist in calling for them on their drawings."

To prove that keyways are a real source of danger, several slides were shown which clearly illustrated that the failure of parts containing sharp cornered keyways always occurred, and started from the sharp corners. The illustrations covered varied styles of work and proved that the point raised was absolutely correct. In every example the remedy was the same, namely, to place a small radius at the bottom of the keyway. The speaker claimed that some concerns were finding it a good plan to make their keyways semi-circular in shape, rather than with the regular straight edge.

Further slides brought out the danger of damaging a piece of steel while grinding. "Even the slightest indent, hole, nick or notch in a piece of steel that has to be hardened is dangerous," said Mr. Stagg. He went on to prove this statement by showing examples of parts that had cracked owing to all of the above mentioned causes. The grinding examples were particularly interesting, and the slides clearly proved that a wheel should be carefully selected to prevent this trouble arising. Not only must the wheel be selected as to grain, etc., but the surface, or face, of the wheel should be kept true and clean. Dirt causes friction, friction causes scratches, and providing the dirt is hard enough, and large enough, the nick becomes almost a small groove. It was surprising to note the amount of damage that could occur from these small cracks.

Never Hurry

The danger of hurrying hardening operations was also covered. "Never hurry a job," commented Mr. Stagg. "Heat slowly, uniformly and thoroughly,

to the minimum temperature required for tempering. Quench and draw the temper immediately after hardening." This statement was repeated time after time during the evening, and as the speaker frankly remarked, "Let that thought sink in, and the evening has been well spent." Various slides were shown that proved conclusively this danger of hurry.

In order to emphasize the importance of slow and even heating, a chart was shown that depicted the fact that up to a certain critical point steel expanded. After this point the steel contracted for a short time, then expanded once more. There is no need to go further into this at the present time except to say that the speaker gave these figures to prove his contention for the necessity and advisability of drawing the temper immediately after hardening.

If a volume in its original state is, say, one inch, the volume after quenching is 1.00077 inches. When drawn immediately after hardening, the volume returns to .99999 almost to infinity, or, in other words, returns practically to its original state, this, of course, relieving internal stresses.

The various slides throughout the talk were of such real merit and value to the designer and mechanic alike that we made arrangements to secure photographs of the best of these, together with detailed data on each example. This will be published in a later issue and should prove of decided interest to our readers.

Officials of the Canadian Government Merchant Marine recently announced a general reduction in cargo rates on goods and materials leaving Canadian ports for Great Britain. The new rate will be 40 cents a cubic foot, or 75 cents per hundred pounds. This is a reduction of about 20 per cent. over the rates formerly in force.

Long Line, Group, and Individual Drive

The Question of Transmission is a Many Sided One. The Three Methods Are Discussed, Actual Figures Being Given to Illustrate and Verify the Statements Made

By R. F. JONES, Research Director for Leather Belting Exchange *

THE question of the most economical and efficient method of transmitting power from the prime mover to the machine tool is still one which has many reasonable arguments for each system of transmission. The industrial engineer has to study the question from its many sides and decide which is the best for his plant, according to the individual problems which he has to solve.

The three systems in use at the present time are:

1. The long line shaft, which drives the individual tools, and, which in turn is driven by the prime mover.
2. The electric system of driving each tool by an individual electric motor.
3. The electric system of driving certain groups of tools by an electric motor through a short line shaft.

The long line shaft running from one end of a factory to the other is the time honored method of distributing power throughout the plant. This system is still in use for many processes of manufacture, and probably will continue to be used for a good many years to come in certain kinds of plants where it is especially well adapted to the work. But for machine shop and machine tool driving the long line shaft is practically obsolete. The line shaft has to be too long to permit good alignment of the bearings, so that the friction loss is apt to be large. However, it has the advantage of low initial cost, and in these days of excessively high prices this is a serious consideration.

For the purposes of the ordinary machine shop or factory the choice of drive now lies between the individual motor system or the group system of driving. In either case electrical power is practically always used. Often an engineer can employ both to advantage, the group system being used for the bulk of the smaller machine tools, and the individual motors being used on the few larger machines, such as those requiring above ten horse-power. The engineer in making his decision will be governed largely by such considerations as first cost, maintenance, depreciation, provision for extension, efficiency of the system, sectional operation, flexibility as to location of tools, and positive application of power.

Individual electric driving of each machine tool came into practice some years ago and gained much headway, but in recent years the trend has been more to the group drive, with the indi-

vidual drive for the larger tools. The initial cost of the individual drive is much greater because of the high cost of manufacturing small units and because of the large total power required.

The following remarks are from a well known encyclopedia and state the general trend of opinion on this subject:

"The individual motor drive with a separate motor attached to each machine makes an installation expensive, and although this form of drive is the most flexible it is frequently giving way to the group drive for light machine shop work.

"The horse-power of the motor required for group driving is much less than the sum of the horse-power required for each individual tool. The reason for this is that some of the machines are idle,

THE THREE SYSTEMS

The systems discussed are as follows:

The long line shaft, which drives the individual tools, the shaft being driven from a prime mover; the electric individual motor drive; the method of driving certain groups of tools by an electric motor through a short line shaft.

and others consume only a small amount of power at the same time, when the remaining machines absorb the maximum amount. Actual experience has shown that for group driving in an ordinary machine shop, a motor of $\frac{1}{4}$ or 1-5 of the total H.P. of the motors required for the individual machines is sufficient."

It is easy to see that the initial investment is materially reduced by using the group system, because the added shafting and belt required is not nearly as expensive as the large number of small motors. Experience has also proved that maintenance and depreciation costs are also less with the group system.

Advantages Claimed

The principal advantage claimed by advocates of the individual electric drive is that it gives a closer speed adjustment of the tool to the work, so that the workman can be running his machine at its maximum output a greater proportion of the time. Most of the smaller individually driven machines are driven with belts by small constant speed induction motors. In this case no advantage in speed regulation of the machine tool is gained because we still have to

use gears with a fixed number of speed changes, the same as we would if the machine were driven from a countershaft with cone pulleys.

With the direct current motor driving through gears we can obtain some speed regulation between the steps of the gears by changing the field strength of the motor. However, closer speed regulation than we get with the modern lathe, where eight speeds is common, and where sixteen can easily be obtained with a two speed countershaft, is a very doubtful advantage, because of the many other variables such as the shape, sharpness, and composition of the cutting tool, which affect the rate of production.

In order to eliminate the cone pulley or the gears, builders of electrical machinery have designed motors for use with machine tools, whose speed range is as great as six to one. These motors are intended to drive the machine direct, and accomplish speed changing by field and armature control. In machine tool work such as lathes and boring mills, the rate of cutting the metal is about the same for any one metal regardless of the size of the piece. If the piece is large the rotary speed will be low, but the motor will have to supply just as much power at this low speed as it does at the highest speeds. Since the power delivered by an electric motor increases with the speed, it is apparent that for a motor to deliver full power at its slowest speed it will be capable of delivering unnecessary power at its highest speeds.

Mr. Alexander Gray, Professor of Electrical Engineering at Cornell University, in his book entitled, "Principles and Practice of Electrical Engineering," gives examples to show the increase in cost as the speed range is increased. He states that a ten horse-power, 220 volt, 1,200 R.P.M. motor will cost 66% more if it is built to give ten horse-power at speeds ranging from 600 to 1,200 or a speed ratio of two to one, and 160% more if the same power is desired at speeds from 300 to 1,200 or a speed ratio of four to one. A four to one ratio is a small range of speed for ordinary machine tools, and yet it increases the cost of the individual motors two and six-tenths times when this system of speed control is used. It is evident that this extra initial cost will not be justified in the average shop.

The multiple voltage systems, which are designed to give the speed changes, by using several different terminal voltages also require oversize motors, so that the increased investment required

*A paper read before the National Association of Leather Belting Manufacturers.

The Group Drive

As the motor belt has been shown, which runs at a constant speed so that either direct or alternating current can be used. This motor drives a short line shaft, which in the modern installations is hung with ball bearing hangers. Line shafts of this type waste very little power, and are in fact, more efficient than the old type which ran the entire length of the shop, and sometimes used up thirty or forty per cent. of the power of the motor.

The group drive is, in fact, five to ten per cent. more efficient than the small individual motor and is also running much closer to its most efficient load, it will save enough power to more than make up for the small loss in the line shaft. Several tools of the same kind are usually grouped together, and space can be left for the addition of new machines. If the engineer wants to put in an additional tool here and there he can easily add to the group. If it is necessary to install several new machines they can be put together and a new group started. In this way expansion is readily accomplished.

The individual drive has a slight advantage if only one machine is to be operated. This is usually provided for by having a few of the individually driven tools in the shop to be used when the groups are not running. With such an arrangement we combine the advantages of the individually motored machine with the economy of the group system.

Advocates of the individual electric drive claim that it has an advantage when arranging the machines to fit in with the continuity of the manufacturing process. A good engineer when originally laying out a plant by the group system will have little trouble in placing his machines so that they accomplish this end. The overhead shafting and the vertical belts are often considered as a disadvantage because they interfere with the light. This may be true in old fashioned and poorly designed shops, but with the modern high ceilings and large windows such as we find today it is rather absurd to say that a reasonable amount of belting and shafting will seriously interfere with the light.

The Belt as a Medium

The group system also has the advantage of having the power transmitted through belting. A belt is a very valuable medium to have between the source of power and the machine, because it often acts as a safety device by slipping off when the machine becomes heavily overloaded. The belt also cushions the machine tool by stretching and slipping when the power is suddenly applied. At first many individually driven machine tools were direct driven by gearing to

POINTS BROUGHT OUT

That the horse power of the motor required for a group drive is much less than the sum of the horse power required for each individual tool.

That the overhead shafting is much less expensive than the line shafts where the lighting conditions are more favorable.

That belts to be efficient should be properly cared for.

That the cost per belt in the average machine shop is \$2.25 per year. This includes original cost, plus labor and material used for maintenance, repair, etc.

That in large machines economy lies on the side of the motor drive, but on small machines the belt drive should still be used.

the motor. This gave an advantage of positive power at all times, but it was soon found that without the belt, serious damage was apt to be inflicted on the tool or the motor when subjected to heavy overloads. Nowadays a short belt is often used instead of the gears, but since the motor is usually high speed and the motor pulley small, the belt has to be kept very tight. Journal friction and wear on the belt are increased thereby with a corresponding increase of maintenance costs.

Too often the salesman of the individual drive will compare the modern efficient methods of the electric transmission with older mechanical installations in which the line shaft losses rose to a high figure. To be strictly comparable the equipment should be modern in both cases. These unfair comparisons have led many people to believe that an individual motor for each machine gives the most efficient and economical transmission. The modern well informed engineer knows that the group drive system combined with a few of the larger machines, individually driven, will cost less and show greater economy of production than the shop equipped throughout with individually driven machine tools.

Frederick Taylor, widely known industrial engineer and famous for his work on shop management, published the following statement in the Journal of the American Society of Mechanical Engineers in 1909:

"The belt is one of the oldest and most commonplace of the elements used in shop practice, so that engineers designing new establishments or remodeling old ones, who wish to be up to date, naturally incline toward the use of the electric drive rather than the belt. There is no doubt, however, that this has led to the use of the electric drive in many instances where the belt would be far more economical and satisfactory in almost every way.

"In the average machine shop, for instance, the writer is prepared to say

that half of the machines in the shop are still being used with greater economy and with more satisfactory results than the electric drive; only on the assumption, however, that the belting is systematically cared for.

"It has been shown by an accurate record kept through a long term of years that in the average machine shop the average cost per belt per year is \$2.25. This includes the original cost of the belt plus all the labor and materials used in maintaining, repairing, and cleaning it throughout its life. No similar statistics for the maintenance and renewal of the motor drive seem to be available, but I think that no one will contend that the latter can in any way approach this economy.

"In large machines economy lies on the side of motor drive in many instances, but with almost all small machines the belt drive should still be used."

Mr. Taylor was regarded as an authority on shop management and he has done some of our best work along this line. He was the first man to make a scientific investigation of manufacturing problems, and his belting records are regarded as the best and most extensive information obtainable on the economic use of belting. His endorsement of the belt drive should carry great weight with the manufacturer who is planning a new shop.

In view of these facts it is apparent that the group drive offers practically all of the advantages of the individual drive, besides having the big advantages of much lower first cost, slower depreciation, and lower maintenance charges.

WOOD TURNING TOOL

A handy tool for turning wood on slow-running lathes is described and illustrated in British Machine Tool Engineering. It takes the form of a thin conical cup of steel, with its base uppermost. The cup is fixed to a holder and is used in the slide rest. It is said to give a good clean finish, even to soft wood, when the work is running at speeds usual in metal turning. To give the finest finish the tool should be set to such a height as to give very small clearance. For the final finish of wood rollers, either solid or lagged, a good method is to use a metal hand plane set to a very fine cut and held at an angle of about 45 deg. The plane should be made to slide cornerwise along the roller with only a small part of the middle of the plane iron in action. Carefully manipulated, this will give a finish equal to that which a carpenter gets planing boards on the flat.

The output of peat in Sweden is stated to be rapidly increasing. During the present year considerably over 400,000 tons have already been dug, corresponding to over 200,000 tons of coal.

Have You Tried This Contest Yet? If not--- Do so Now

Below will be found twelve references to advertisements in this number. To the sender of the first correct set of answers to these we will forward one of these scales.

To win one is not difficult, and at the same time you will add to your store of knowledge. Read the details given below.



The scale is 6 in. long and is made from finest quality steel. One side is marked in 32nds, the other side in 64ths. A table of decimal equivalents is also stamped on one side, and a table of tap drill sizes on the reverse side. This scale is well worth securing.

What You Have to Do

We publish every week a number of interesting facts or statements selected from the advertising pages for that week. The selections for this issue are given below. Read these through, then turn to the advertising section and see if you can pick out the advertisements to which they refer. The work is interesting, it will train your powers of perception and of memory, it costs you nothing, it will make you better acquainted with the various lines of machinery and tools in the market, and with perseverance you are bound to win one of these useful scales as a prize.

G. A. Todd, Penetanguishene, Ont., is the winner for the January 27th issue. He was the only reader with all answers correct. Quite a few were out on query No. 12, which read "A suggestion worth considering." On page 79 of that issue were these words: "If what you want is not here, write us and we will tell you where to get it." This was, to our mind, a suggestion worth considering. How about it? We appreciate the interest taken by readers in this contest, and will in every possible way make it interesting.

CONTEST FOR FEBRUARY 17TH ISSUE

Contestants are required to write us, stating to which advertisements we refer in this number.

- 1—Something that claims to make more—yet with less?
- 2—Something specially adapted to hard usage.
- 3—A pertinent question.
- 4—Something that requires no patterns.
- 5—How to save three important things.
- 6—Something that although not new is guaranteed.
- 7—How to solve your metal cutting problems.
- 8—Something that can be depended upon under all conditions.
- 9—An important request.
- 10—Something that actually has steel fingers.
- 11—A product of smooth appearance.
- 12—How you might cut 25 per cent. of your cost in castings.

These are Correct Answers for List from January 27th Issue:

- 1—The Consolidated Iron & Steel Mfg. Co.
- 2—Canadian Machinery.
- 3—Cleveland Pneumatic Tool Co.
- 4—Armstrong Bros. Tool Co.
- 5—J. C. McLaren Belting Co.
- 6—Canadian Asbestos Co.
- 7—John Hepburn, Ltd.
- 8—Canadian Driver-Harris Co., Ltd.
- 9—Gisholt Machine Co.
- 10—Landis Tool Co.
- 11—Armstrong-Whitworth of Canada, Ltd.
- 12—Canadian Machinery Division's Machinery

Closing Date for This Contest is March 10th.

John Gets a Lecture on "How to Run a Lathe"

The Operation of a General Purpose Lathe—Text Book Lore and Actual Conditions in the Shop Sometimes Differ—Supporting the Work—Points to Watch—Using Plug and Ring Gauges.

By J. DAVIES

ONE of John's ambitions in life was to operate a lathe so that when the foreman told him they were getting pretty well caught up on planer work and asked him to operate a lathe he readily agreed to do so. When he got home to his father that evening he said, "I am going to try to run a lathe to-morrow and I want you to give me a free lecture on lathe work."

That evening John and his father got together for a talk. "Don't you think that the lathe is the most important machine in the shop?" John commenced.

"I couldn't say any machine was the most important," remarked his father, "but without accurate lathe work no modern machine shop can exist. It is capable of a larger variety of operations than any other machine in the shop, and it requires considerable care and skill to become a good lathe hand. It has been found that many operations can be more economically performed on a lathe which is specially adapted for some specific purpose, so that we have a number of lathes that are really special types in their own line, such as axle lathes, wheel lathes, turret lathes, etc. We will take for our talk the operation of a tool room, engine, or general purpose lathe, as any man that can operate a lathe on general work will have no difficulty in operating a special machine, the main principles being the same.

"Consider first the turning of a plain round bar, and deal with conditions as we find them; there is a world of difference between actual conditions as you find them in some shops, and what you read about in text books. This bar might have been cast in the foundry, cut off with the shop saw, or as it often happens, the saw was busy with another job, so the blacksmith just nicked it round with a chisel, and broke it off, leaving a nasty ragged end. The first thing to do is to face, or cut off the bar to the proper length. If the bar has a ragged end, don't waste time finding center with compass or jenny-legs. Put the bar in the chuck, passing the bar through the hollow spindle of the lathe, and leave just enough sticking out of the chuck to face or cut off

use a cutting-off tool any longer than is necessary, the length should slightly exceed half the diameter of the bar to be cut, the width from 3-16 in. to ¼ in. After facing the end the most convenient tool for centering is a combined drill and countersink to fit the tailstock, which is then fed into the bar with the tailstock spindle. A very useful tool is a centering tool. It is made of standard size tool steel hammered out like a flat drill, used in the lathe tool post like any other drill. It is indispensable for truing up the centre of an old shaft. The centering drill or tool should be at an angle of 60 deg., to suit the angle of the lathe centres.

"It is important to have round, smooth centers at the correct angles, as it is impossible to do good lathe work with bad centers. If the center is not made with a combination drill and countersink, a small hole should be drilled into the bar to ensure that the center will not ride on the point when the center hole wears a little."

"How about the centering machine we have in the shop, why not use it?"

"Use it by all means when you can, but you will often find the conditions just as I have described them. The first operation is to cut to length, then center; don't have your centers in a small projecting piece that will be cut off after the job is done, but rather leave your centers in the finished job, then it will be very convenient if it is necessary to put the piece back in the lathe at any time.

Ready For Turning

"After centering we are ready to begin turning. Put a lathe dog on one end and lubricate the center hole at the other end. The tailstock must be set to the proper position for holding the work between the centers; don't wind out the tailstock spindle any further than is necessary, and have the pressure on the spindle such that the work can be turned by hand, but not loose enough to have any end play, or fall down by the weight of the dog. Be sure that the tail of the dog is quite free in the slots of the faceplate of driving plate. A common mistake for beginners is to have the tail of the dog held up in such a manner as to hold the work away from the live center, thus causing the work to run untrue. Some prefer to drive a round bar with a dog with a straight tail, driven by a pin bolted in one of the slots or holes of the face plate. This gives a direct drive and avoids all possibilities

of twisting or ramming of the tail in the slot.

"The next thing is to see that the bar is running true. It may be true at the ends, but bent in the middle more than the amount of stock to be turned off. If there is no special straightening machine, and it is seldom there is, it can be straightened between the centers of the lathe either by the use of a jim-crow or with a bar or lever, unless the job is a heavy one, when it might be necessary to take it to the blacksmith shop. Straightening a shaft cold in the lathe stretches the metal and sets up a kind of internal strain in the metal, so that it will very seldom remain true after being cleaned up with one cut; never try to finish a job with one cut that has been straightened in the lathe. If there is an old lathe that can be used for straightening, so much the better, as straightening between the centers is bad for the lathe and should be avoided if possible.

"In using the jim-crow, revolve the work round in the lathe and hold a piece of chalk against it to find the high spots. Put the high spot or bent part at the top, right under the screw of the jim crow, and tighten up the screw until you judge you have taken out the bend. Test the bar by revolving it round again, and repeat the operation until you have the work true enough to turn up. The work can also be straightened by putting a bar or lever under the work in such a way that when the bar or lever is pushed down the work is sprung up, only in this case the marked or bent part must be down. After a few trials it will be found to run nearly true. If the bar is too stiff to be straightened by simply springing it with a bar, give it a few sharp blows with a hand hammer on the top of the shaft while holding it up with the bar. The hammering should be light or the bar will be found to be bent the opposite way.

Watch the Centers

"If the job has been straightened between the centers, examine the lathe centers before starting a cut, putting the lathe on top speed to see if the live center is true. If the live center is slightly out of truth, although a piece of work turned out on it might be straight and true, or a number of different sizes were turned, they might all be true with each other, they would not be true with the center hole in the shaft. If, however, the dog was loosed off and clamped again in a fresh place, or the piece was turned end for end, it would

Supporting the Work

"If the lathe spindle should be hollow you will need to support one end with a steady head. If there is sufficient length to cut off, use a cutting-off or parting tool, but if there is not more length to cut off than the width of the

not run true, so that it is very necessary to have a true live center, especially when work passed from one lathe to another before being finished.

"The dead center should always be hardened. The live center may, or may not, be hardened, according to circumstances. If a live center is turned, hardened, and then put back into its place the chances are that it will not run true, owing to unequal expansion and contraction in the operation of hardening and tempering. To use hardened live centers they ought to be ground in their place by a special grinding attachment for that purpose. On the other hand, while a soft lathe center can easily be turned up and tried it can easily be bent or bruised and made untrue. If you are working in a shop that has grinding attachments for the lathe, by all means harden the live center, but if not, better leave them soft, or have the temper drawn just enough to turn.

"Even though the center is ground perfectly true, it will be found that after removing it and putting it back it may not run true. This is due to the fact that the center hole in the spindle is not always absolutely true; therefore, when turning the center always make an identification mark on it, and on the lathe spindle to enable you to put them back in the same place.

Centers Must Be in Line

"In order to turn a parallel bar between the lathe centers it is necessary for the lathe centers to be in line with each other and with the line of movement of the tool rest. To test this, use a bar about 2 ft. long with a small portion at each end turned to the same size or slightly less in the middle for clearance; set the tool to just touch one end of the bar, then run the carriage along to the other end, move the tailstock whichever way it needs to go until the tool exactly touches either end of the bar. If the end of the tailstock is not already marked, make a reference mark with a fine chisel, so that it can be put back to the same place if you need to move it at any time.

"If you have no test bar, or no time or opportunity to make one, try out the centers by using the job in hand. Turn a small portion at each end to the same size, then, instead of undercutting the middle for clearance, set the tool to touch the turned portion at the live center end, take the job out of the centers, or if it is a light job turn back the tailstock center enough to allow you to run the carriage to the other end against the centers and test as before. If the job is too heavy to conveniently take out of the lathe, note the graduations on the cross feed screw or make a reference mark on same and see that the tool just touches each end of the turned portion when the reference mark on cross feed screw is the same. Another result of the centers not being in line can be seen by facing the end of the work be-

tween the centers, when, by placing a straight edge across the end it would be found that the end would be concave or convex, according to which way the tailstock needed to be moved, as the centers have to be exactly at right angles to the cross slide to produce a flat surface.

"Volumes have been written about the theory of cutting tools, but to specify the exact size and shape of all the different lathe tools is too big a job for me. The shape of the tool depends entirely upon the nature of the job and the kind of metal to be cut. Generally speaking, the softer the metal to be cut the sharper the tool, while with hard metal there is less clearance. Cast iron can be cut with a broader nosed tool than wrought iron or steel, because the chips break off more readily and thus relieve the tool, allowing a broader nose and rougher feed.

The Height of the Tool

"It is important to have the tool at the right height, so in order to insure this make a mark on the tailstock spindle exactly the height of the lathe center, put a parting or cutting-off tool in the tool post and adjust it to the exact height of the lathe centers. Now slightly press it against the tailstock spindle and run the carriage along, making a permanent mark on the tailstock spindle about 2 inches long. This will be found very convenient, especially when setting the tool for taper work.

"Set the tool a little above the center; by using the reference mark on the tailstock spindle you will know exactly the height of the tool in relation to the lathe centers. The larger the diameter of the work the higher you can set the tool above the lathe centers with advantage. Avoid setting the tool below the center, because if there is any lost motion in the screw or slackness in the slide, the tendency is to pull the tool into the work, when, without warning, the job will climb over the top of the tool and jump out of the centers. Fasten the tool in the tool post as close to the cutting edge as possible and keep it quite clear of the work while doing so.

"Making the first cut is entirely a matter of judgment. Try the calipers on it as soon as you can, but be careful not to take too much off at the first trial, as there are no lathe putting-on tools. After adjusting the cut to the right size start the feed and let it run half way up the bar, then remove the work, run the tool back to the starting point, replace the work in the reverse position, and let the same cut run over the part that has not been turned. The work will now be the same size at both ends and the cut will meet in the center. If the live center should not run perfectly true it will be least noticeable where the cuts meet in the middle of the bar.

"If it is necessary to take a number of cuts, and a very accurate job is wanted, it is best to reverse the work at every

cut so that the centers will wear even. Before clamping the dog to a finished surface, place a piece of sheet brass about the size of a postage stamp under the setscrew to save marking the surface.

The Finishing Cut

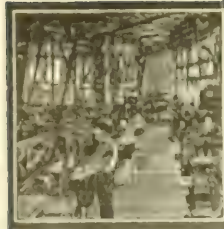
"Always grind the tool before taking the finishing cut. Finishing tools, as a rule, will stand a little more rake on top than roughing tools. Take the finishing cuts with a fine feed and at as high a speed as the tool will stand up to, considering the diameter and length of the job being done.

"A good lathe hand can, with care, detect a difference of .001 inch with an ordinary pair of spring calipers. They should be held lightly between the thumb and fingers of the right hand, while the thumb and forefinger of the left hand hold one of the caliper points stationary on the piece to be calipered. Gently swing the other point across the work and move it in and out until you find the place where the point has the least travel. This is the smallest diameter that can be found, and is at right angles to the axis of the shaft. When this point is determined let the calipers pass over with a very slight pressure; some prefer to let the calipers pass over without touching, noting very carefully the amount of side play or travel of the calipers at the smallest part and then have the same conditions exactly on the plug or piece that they are measuring from. This is probably the most accurate way, but it requires some experience as it depends more upon judgment than sense of touch.

"If the shaft has to be turned to fit a ring gauge it must of necessity be a few thousandths less than the ring gauge, depending upon the diameter, as a ring gauge of 3 in. diam., for instance, will not pass over a 3 in. plug, although sometimes plug and ring gauges are made to pass over each other, especially homemade ones.

"When using the plug and ring gauges remember that the kind of fit that the ring and plug gauge make with each other is exactly reversed in the work. If the plug and ring gauge will not go together the work made to them must. If the ring and plug will pass over each other the work may not, as it would depend on whether the work was a closer fit than the plug and ring gauges are to each other. These conditions apply when the hole in the work is made to fit the plug, and the shaft turned to fit the ring, so that if the plug and ring gauges were being made for parts that were wanted to be a forced or driving fit it would be necessary to make the gauges so many thousandths slack.

"But look, it's 11:30 p.m.—Off to bed, or else you'll be so sleepy in the morning you'll fall on top of the lathe and ruin all the benefit of my talk."



DEVELOPMENTS IN SHOP EQUIPMENT



WEB THINNING MACHINE

The Hurler Bros. & Co. Ltd. of London, England, have developed a new and reliable twist drill point—sharpening and web-thinning machine. The principle upon which the construction is based, is to revolve the drill continuously in one direction and to impart automatically to the drill when so rotated, the necessary motions to give the correct clearance to the lips, also to feed the drill forward a predetermined amount once during each complete revolution, the mechanism for giving the correct form repeating its movement to both lips. The machine will grind any quantity of drills automatically to one length. This is a feature that will be appreciated where multiple spindle drilling machines are being used.

The machine is built in two types, one a full power model, in which all motions are operated by power and only requires the operator to reload the drills; the other is a hand machine, which embodies the same motions, but having only the grinding wheel driven by power. In the former type of machine a point-thinning arrangement is fitted for thinning down the web of the drill at the cutting point. On the latter type this arrangement is

only fitted upon request, although all provision has been made for the same.

The machines are entirely self-contained, being driven by fast and loose pulleys embodied in the wheel head, therefore no countershaft is required. A centrifugal pump, together with necessary piping provides ample lubrication to the grinding wheel. This lubricant is returned to the supply tank after use.

As previously stated the various motions necessary to grind the correct clearance to the cutting lips are produced automatically. In the case of the fully automatic machine these motions are driven from the grinding head spindle, and in the case of the hand machine they are produced by the operator revolving a hand wheel which replaces the crank handle seen to the left. No special settings are required for the various range of drills. The drill is chucked at the end into an ordinary socket. A quarter turn of the knurled nut seen on the spindle secures the drill in position. During this action the sleeve bush A is locked against rotation by the latch as seen, so that the correct relationship between the drill and the cam motion may be ensured. The hand wheel is now tightened which locks the spindle and as

the automatic motion is engaged, the latch automatically comes out of engagement and grinding proceeds. The drill is given a swivelling and a reciprocating motion which causes the work spindle as it rotates to advance and retire from the grinding wheel.

In the case of the swivelling motion, the action is produced by worm and worm wheel and bevel gearing, driven from the main spindle, which gives motion to a vertical shaft mounted on the swivel slide B. To the end of this vertical shaft is fitted a crank disc, and by a connecting rod L is coupled to a stationary part of the machine M. This motion causes the swivel to pivot round the vertical axis of the drill support bush. The reciprocating motion is produced by means of a face cam E which makes contact with a fixed roller. The cam is mounted at one end of a horizontal shaft D which is rotated by bevel gears from the vertical shaft. At the other end of the camshaft is fitted a yoke C which couples up with the sleeve A. Thus as the camshaft rotates, the work spindle, through the medium of the coupling yoke, is moved backwards and forwards. By means of the spur gears F N a 2-to-1 ratio is obtained, which causes the work spindle to rotate once for every two revolutions of the camshaft, thereby repeating the reciprocating motion for each of the drill lips.

A cross slide is fitted which automatically moves the work to and fro across the grinding wheel face. The slide can be adjusted into various positions by means of a small hand wheel. The motion is taken advantage of to effect an automatic feed which is of the simple ratchet type, and adjustable from 0.001 to 0.015-inch advancement to one revolution of the drill. It is arranged so that it will automatically trip as desired.

The point-thinning arrangement is made to carry the drill at the correct angle to the grinding wheel. It is provided with a stop which supports the end of the drill, and a finger to engage with the cutting lip of the drill. The motion is given by a lever operating the slide and passes the drill beneath the grinding wheel.

Three grinding wheels are supplied, each mounted on its own bush. Vertical adjustment is provided to compensate for wear of the wheel and the size of the drill being thinned.

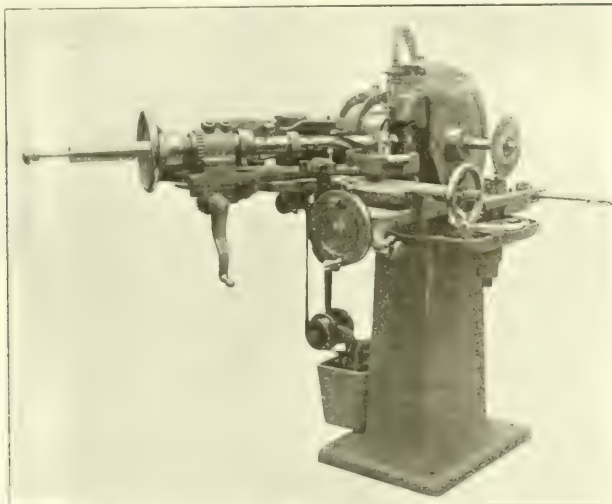


FIG. 1.—A GENERAL VIEW OF THE WEB THINNING MACHINE

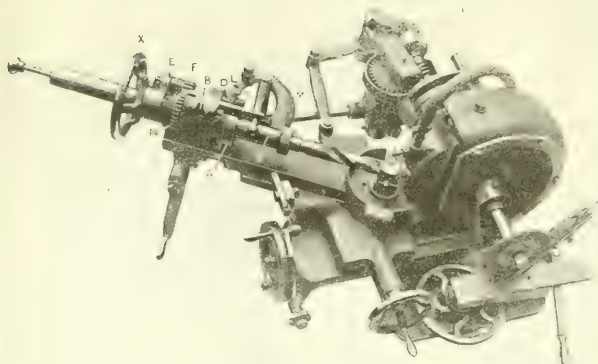


FIG. 2. A PLAN VIEW OF THE WEB THINNING MACHINE

NEW THINGS IN MACHINE TOOLS

NEW STYLE VICTOR DIE HEAD

The Victor Tool Company have redesigned their "D" head, adding certain improvements and classifying it as "style E." The tools are adjustable for variation of thread fit. The shanks are hollow for long work. Provision is made for extension of the dies through the cap when cutting close to shoulders. Internal or external tripping may be provided. The head is made entirely of steel. At present the head is made in two sizes, the range being from $\frac{1}{4}$ to $\frac{1}{2}$ inch and from $\frac{1}{4}$ to $\frac{3}{4}$ inch.

STAGGERED-TOOTH KEYWAY BROACH

A specially designed keyway broach has been brought out by the Velco Manufacturing Company, of Greenfield, Mass. The broach is made from a solid bar, the staggering being obtained by milling the teeth from either side and in such a way that the cutting edges of the teeth overlap, thus making a clean cut. The teeth are deeply cut and made with a large radius, giving extra strength and chip clearance. The cutting faces slant in opposite directions, which gives a shearing cut and equalize the side thrust on the bar. The broaches are made in all standard sizes.

LAMINATED SHIMS

The Laminated Shim Company, of New York, has recently placed on the market a specially constructed shim that is made up of thin layers of metal, so that shims of any desired thickness may be obtained by simply "peeling off" the

number required for the necessary thickness. It is termed the "Fit All" owing to its adaptability to fit any style of automotive bearing with little or no trimming, the shape being decided on after a thorough study of about one thousand different bearings. The shims are made up in different thicknesses and can be supplied with two different sizes of holes.

"MICRO" BOX TOOL FOR TURRETS

The Cruban Machine and Steel Corporation, of New York, have placed on the market an interesting design of box tool for use on screw machines and automatics. Adjustment for the tool bit is provided for by means of a micrometer attachment, graduation reading in thousandths of an inch lineal adjustment. The "V" guides are controlled by spring pressure and may be locked in position when adjusted to the diameter of the work. If desired a bushing plate, which will carry bushings of any desired size, may be used instead of the V guides. Special arrangement of the tool bit prevents the same from slipping.

HORIZONTAL BORING MACHINE

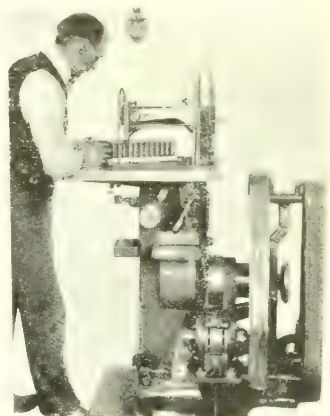
A new addition to the lines of the Giddings and Lewis Machine Tool Company is a horizontal machine known as No. 25, with the following principal dimensions: The diameter of the main spindle is $2\frac{1}{2}$ inches, the front end provided with a No. 4 Morse taper, the spindle having a travel of $13\frac{1}{2}$ inches. Extreme distance between table and work centre, 20 inches. Table has a surface of 18 by 48 inches,

DIE FILING MACHINE

W. D. Rearwin, Grand Rapids, Mich., has placed on the market a No. 6 die filing machine. This machine is larger than the regular No. 5 size, and is said to prove itself useful for many other purposes beside die filing.

The machine is provided with a 20-inch x 24-inch table that is 30 inches high. The slide is a forging and has a capacity to take files of random lengths up to 14 inches. The space back of the file is 9 inches and 8 inches from top of table to under side of file arm. The slide has a stroke of 7 inches and recedes from work on the up stroke. Extra arms are provided for sawing, and special filing of closed bottom dies, also for patterns where filing against a shoulder is necessary.

This machine can be furnished with motor, countershaft, or can be driven direct from the line shaft.



GENERAL VIEW OF THE FILING MACHINE

with a traverse travel of 33 inches and a longitudinal travel of 30 inches. Eight spindle speeds are provided for, with a range from $12\frac{1}{2}$ to $337\frac{1}{2}$ r.p.m. There are nine feeds in either direction. Power required, 3 horsepower.

HYDRAULIC PRESS

A very useful hydraulic press for general jobbing work has been developed and placed on the market by the Charles F. Elmes Engineering Works, of Chicago, Ill. The machine is particularly adapted to forcing, bending, straightening and broaching work, having a capacity up to 50 tons. Suitable attachments may be used for a large variety of operations. By using the lower portion of the press alone, the cylinder makes a serviceable 50-ton jack. The machine is lightly constructed and may be readily moved to any location and placed in any position desired. The press weighs about 500 pounds.

The MacLean Publishing Company

LIMITED

JOHN BAYNE MACLEAN, President H. F. HUNTER, Vice-President
 H. C. WHEELER, General Manager
 PUBLISHERS OF

CANADIAN MACHINERY

MANUFACTURING NEWS

A monthly journal devoted to the machinery and manufacturing industry.
 E. G. NEWTON, Manager A. R. KENNEDY, Managing Editor.
 Associate Editor:
 J. H. MOORE H. FENNER J. H. RODGERS, Montreal
 Office: 100 University Ave., Toronto, Ont.

VOL. XXV. TORONTO, FEBRUARY 17, 1921 No. 7

PRINCIPAL CONTENTS

Tooling the Modern Turret Lathe	33
One Method of Producing Steel Barrels	37
Various Clamping Units of the Slip-on Type	39
Making a Bent Ring Clear on the Bulldozer	40
Long Line, Group, and Individual Drive	43
Canadian Machinery Weekly Contest	45
John Receives a Lecture on "How to Run a Lathe"	46
Developments in New Equipment	48
Editorial	50
Market Developments	52
Selected Market Quotations	56
Industrial Developments	60

More Metric Propaganda

CANADIAN MACHINERY has received from the World Metric Standardization Council a letter stating that the Metric Standards Bill has been introduced in the Senate of United States, and goes on to state:

"Favorable editorial comment by your publication would aid powerfully in securing for the United States the advantages of this logical system. It is believed that the enclosed items will be of interest to your readers.

"May we count on your co-operation?"

Well, that's a fair question and calls for a fair answer, and that answer is no—not for a minute.

As a matter of fact this whole metric system is a piece of propaganda. It is not wanted by the mechanical world. We have gone along famously on good old feet and inches. We have measured ourselves up against the kitchen door year after year—we bought a piece of land—we built a house—we got a suit of clothes—we made a machine tool—we made small tools and we put up factories. We drew plans and made blue prints—we laid out concessions and side lines—we built bridges, some of the largest in the world.

And say, all these were based on inches and feet and the only thing that worries some of us now is that we have to measure our business with a foot stick when we'd like to be using a yard measure.

There are bigger problems to be solved and more worthy matters to which any publication can lend its assistance.

The agitation carried on by the World Metric Standardization Council will have a fair sized job trying to explain why it should not be tagged as an ordinary nuisance.

The Public Pays

THE action of the United States Railroad Labor Board, in rejecting the appeal of the Association of Railway Executives for abrogation of national working agreements, is a feature of industrial economics that must be paid for by the public at large.

In times like the present, when the requirements of a

railroad are appreciably lessened, and it becomes advisable, if not imperative, to reduce the operating staffs, the feature of seniority, while highly commendable in many ways, nevertheless places upon the management and the executives, responsibilities and obligations that disorganize, completely, any plans for efficient production and maintenance of ordinary operations. When a reduction of force is decided on, the department heads have no choice in the matter, as to who will be retained. The question of wages is not considered. A certain number of men must go and they are deleted from the bottom of the seniority list, irrespective of their qualifications. Several 100 per cent. men may be included in the "lay off," while others of, perhaps 70 to 80 per cent., are retained. This means greater outlay on the part of the management, both as regards the payroll and the increased supervision required in checking the work of the inefficient "seniors."

During the past year railroad companies have been forced to let highly skilled apprentices leave their service owing to the enforcement of the seniority clause. On the expiration of apprenticeship the boy becomes a junior, and as a result, he cannot be employed as a journeyman until all those "senior" to him have been re-engaged. A fifth-year apprentice may be nearly 100 per cent. proficient on locomotive work, but must give way, if a man is required, to one who may have had only a year's experience on this class of work. In cases such as these the company suffers heavily, as the education and training given to the boy is, in a measure, gone for naught, at least so far as direct returns to the company are concerned.

The public ask the "why" of increased freight and passenger rates. Well—the railroads, like any other business, cannot continue to play a losing game—therefore, the public pays.

Striking Both Ways

TO what extent can a buyers' strike be successful in beating down prices? And if a producers' strike goes along hand-in-hand with a buyers' strike, which is going to win out in the long run?

Production right now is under consumption in nearly every line. There are very good reasons for this, which need not be gone into here. But available supplies are being worn down in nearly every line and are coming to the point of exhaustion. Demand is likely—almost certain to increase, because now it is at the minimum and any movement will be on the upward trend. When this starts what is going to happen?

One of the best market reviewers on the continent sums the situation up something like this:

"When a railroad falls behind in keeping up the physical condition of its property, there sets in a cumulative deficiency of maintenance, which can only be made up by devoting for a time much more than the normal amount to this purpose. Correspondingly, there is no doubt a cumulative deficiency of production in many lines. Meantime, there is always a minimum amount of consumption going on. Probably, inventories are not as large to-day as they were three months ago. When the public finally makes up its mind that prices have reached bottom, it may be found that, as in the case of the stock market, most of the cheap merchandise had already been disposed of."

The buyer will have to size up the situation to meet the requirements of his own case and he should be in a position to analyze his own field. There is a very real situation in the opinion given above and purchasing agents and others should watch carefully to see that it does not work out and catch them rushing into a rising market, when all the time they had been waiting for it to come still lower.

Some Plants Have Not Lost an Hour Yet

IT is quite wrong to suppose that factories in general are closed down in Canada. They are not. Neither is it right to imagine that they are all running short time in an effort to give as much work as possible to the staff.

From letters received by Canadian Machinery it is certain there are plants that have not yet lost an hour—some of them are working twenty-four hours a day.

There is no intent on the part of this paper to make it appear that everything is lovely, but there is a desire to allow information to come to the surface that will tend to show some of our blue-ruin shouters that industry in the Dominion is a long way from being headed for the bow-wows and that there are men who believe the bottom of the hill has been reached and that we are already starting on the way up again.

There is nothing more dangerous than insane optimism and nothing worse than unfounded pessimism. Between the two there must be the real situation—the one the people want to know about and ought to know about.

If you know of anything that looks to you like a hopeful sign either in your own business or in businesses with which you come in contact, let us hear about it. Give us the chance to pass it along. The circulation of business facts will make good reading now.

Believes Orders Must Come Soon

A. T. Enlow, of the Dominion Sheet Metal Corporation, Hamilton, although not prepared to offer many things to boost the general situation, says: "There is a slight increase in the number of small orders being received and if this indicates anything we presume it means that the buyers are getting down to the boards and need the stock, but naturally are not buying very heavily until they feel sure that present prices are right. We never had all good conditions simultaneously, such as first-class quality, A1 service, lowest price and plenty of business, but the buyer must keep in mind that all the three other items cut little figure if he does not have good service and the wise man is the one who gets in at the right time."

Finished Many Boilers

The Robb Engineering Works, Limited, Amherst, N.S., have been busy filling orders and right now are working on four Robert Manning type vertical boilers of 365 horsepower each for the Nashwaak Pulp & Paper Co., St. John, N.B. One of the Montreal schools had a good-sized order with them as well as the Montreal Harbor Commission. The Montreal Suspender & Umbrella Co. have also been purchasers of equipment from the Robb Co., while boilers have been shipped for installation in a number of new buildings that have been going up in Montreal and district.

Here's a Busy Plant

The president of one well-known Ontario plant pays his respects to papers in general for publishing "absolute fiction, mechanically produced from the brains of well-educated editors, whom it would appear are paid by the word, to fill up white space." But after that preliminary canter this manufacturer gets down to business and makes it perfectly plain that things have been good with his plant. So far they have been able to keep their shop going and have not lost a minute and in one department that is working now with a view to building up an export business, they are going it twenty-four hours a day. He adds: "We notice a great improvement in inquiries. Particularly in the wholesale hardware trade stocks have been very low and as we guaranteed prices for a while that has stimulated buying."

Nor does this manufacture drop back on the old statement that collections are poor. Here is his view: "Collections are as good as usual, i.e., they are far better than they were before the war. People seem to have cultivated the idea of paying cash and we have nothing to complain of in this direction."

Not Impressed by Retailers

"We have not created any change in employment conditions," he continues, "so that there has been no complaint from the employees. We do not know just when wages will have to be brought down. Speaking generally, we do not think it is time to bring down wages on a flat scale, for the reason the workmen to-day is not benefiting by any supposed reduction in the cost of farm produce or in the cost of eats, for while the farmer and the manufacturer and the wholesaler have reduced their prices, the retail merchants have not decided to cut to the consumer yet. At least if they have it is not visible and many of the retail merchants, especially in wearing apparel, have become fakirs." The writer of this opinion then goes on to give the grounds for this statement, claiming that two Toronto stores had deliberately misrepresented the goods they were trying to sell.

This manufacturer holds strongly to the view that the price of material in the retail stores is a very real problem for the manufacturer at the present moment, for he cannot very well adjust wages until a reduction has definitely been made in the cost of living and passed on to the consumer.

Better Conditions Ahead

A. M. Kerr, secretary-treasurer of the Preston Woodworking Machinery Corporation, states that their plant up to now has been working full time without any reduction in wages. Orders are being pretty well overtaken now and it is the intention of the company to make a small cut in wages shortly. Of conditions as their travelers find them, Mr. Kerr says:

"We have very little business on hand now, but our travelers seem to be successful in securing up a few orders every week and they report conditions as being quite hopeful. It seems that there is business going, but it seems necessary to go after it with every possible atom of energy to successfully land an order. Our business is almost entirely derived from furniture factories, automobile factories and kindred lines. Furniture men report business as improving and they seem quite bright just now. Conditions in the automobile industry are looking better, too, and we confidently expect to be able to sell a goodly part of the output of our plant. We propose running along full force as long as possible, stocking up any surplus machines."

"We are getting better production per man in our plant than we did a year or so ago and this to our minds is the solution of the whole difficulty in our country to-day—more production per man, enabling us to lower prices and thus secure business which would then be offered."

Just Sawing Wood

J. W. Shepperson, secretary-treasurer of Ham Brothers, Brantford, never could see blue ruin. Nor has he seen any reason to cross the floor in the present situation. "Would just add," he states, "that from some of the gloomy countenances one looks upon these days you would think this was actually the first period of depression the world had ever seen. Many a time in the past we have pulled through a far more depressing time than the present and we are of the opinion that if we just keep a stiff upper lip and keep on sawing wood it will not be long before we have the stick sawed through and no one will be very much the worse of the effort."



MARKET DEVELOPMENTS



Some Reductions Announced This Week

Prices on Several Lines Have Moved Down From Ten to Twenty Per Cent.—Iron and Steel Prices Are Not Regarded as Being Very Firm and May be Marked Down

WHILE it is not possible to say that an era of lower prices has definitely set in on the iron, steel and machine tool market, it cannot be denied that the movement is in that direction. Especially is this so in machines turned out by the newer makers as some of the old-established companies are still working on orders and are in no mood to consider reductions. Many of the makers have planned their course very carefully and have avoided making up a large stock to urge lower prices on their sales force. Reductions during the week have been made in motors, gear cutting machines, internal grinding machines, etc., and these range from ten to twenty per cent.

Dealers are taking a more determined stand regarding cancellations and it is not an easy matter to get a cancellation accepted now. One firm cancelled the day the machine came, but the dealer fought it out in the courts and made acceptance necessary.

Some houses are reporting a much better week in inquiries

than for some time past. None of these had been in the market before and they were from a widely distributed area.

Steel merchants are not taking in much material just now, still working on the theory that their best move for the present is to get their stocks down as low as possible. There is a fair amount of business going, but it is still in small quantities and for only immediate needs.

There is nothing better in the scrap metal markets. Dealers will hardly take on anything in iron and steel and only limited quantities of copper. Copper is looked upon as likely to improve before the other lines. Prices quoted are still very low and are not guaranteed.

Pittsburgh reports indicate that buyers generally anticipate some movement in steel there and predict that it will be downward in price. There are plenty of rumors of prices sagging several dollars a ton, but this has not become general enough yet to establish a new market at a figure below the price of the United States Steel Corporation.

MONTREAL BUYING IS STILL DONE ON SMALLER SCALE THAN USUAL

Special to Canadian Machinery

MONTREAL, Feb. 17.—Despite the readiness on the part of buyers to take advantage of any discounts offered—which evidently shows a supply of available money for purchasing purposes—the acquisition of equipment is confined almost entirely to urgent requirements, and it is seldom reported that manufacturers are taking care of far future needs. The general tendency still appears to be that of deferring buying at present prices or while trading is in a state of depression. On every hand one sees and hears the note of optimism but seldom sees the instrument on which it is played. Some dealers are reporting slightly increased business, but only after strenuous efforts on the part of the salesmen. As one representative said: "Many seem to be willing but are evidently afraid."

Further Revisions Possible

Despite the recent announcements of different steel men that quotations were at rock bottom, there are indications that point to further revisions in existing prices, and that these will be downward

week's activity, one dealer remarked: "We are not taking any steps to revise our prices, although this may become necessary in the next few weeks. Our business just now is not heavy but the movement is satisfactory. There is a possibility that mill prices in the States will be affected shortly, as some of the independents are quoting low in order to get business. Should this influence the big fellows to cut their present prices the result will be a general adjustment on the part of the dealers to meet the conditions of the new market. It may be that action on the part of the large interests would tend to place trading on a firmer basis, but there is this fact, the Steel Corporation has large orders still on the books, so they have no good reason to meet the lower prices."

Looking For Better Business

When one local machine tool maker remarked to Canadian Machinery that "business should show steady and increasing acceleration from now on," he

many during the past few weeks. This dealer admitted that up to the present no tangible reason could be given for the general optimism displayed other than the general need of all industry. "A great number of manufacturers," said the dealer, "have, during the past few years, practically starved themselves in the way of purchasing needed machinery and equipment. At present the buying is restricted owing to existing conditions of high costs and financial difficulties, a feature that is responsible very largely for the trade depression of the day. When the time comes when these obstacles will have been eliminated or reduced, the business will return in such force that we will have difficulty meeting the demand. This may seem like overdone optimism, but the trend undoubtedly is towards better business."

Asked as to the exchange situation, the dealer stated that the American tool manufacturer has been treating them fairly in the way of absorbing the high exchange, many of them leaving only that over 10 per cent. to be handed on to the buyer. Some of the principals had reduced the list price of the tools and when this had been done, the full exchange had been added. In some cases

the change made little difference, as the reduced list price plus exchange was equal to the former price with the exchange discounted. Movement of heavy tools is quite quiet and supplies and small equipment show little improvement.

Metal Prices Firm

Metal movement is not heavy but is still sufficient to retain the interest of the trade. Prices are quite firm and in some instances show a tendency to become stronger. This is especially true of coppers. Tin is gradually coming back to normal, the price quotation this week being 40 cents per pound.

Old Metal Business Quiet

"We are looking forward to an early revival of activity and while any day may see a movement to better business, we can only repeat what we have been saying for several weeks back, and that is, that present movement is just about enough to pay the overhead and keep the office open. However, we believe the tide is at its lowest and that soon we shall see a gradual return to normal." This statement by an old material dealer differs little from what has been given for the past few months, and no concrete evidence is available to indicate a change for the better. Some local trading is carried on, chiefly with the grey iron foundry shops. Developments in the steel and iron market may influence the scrap situation to the extent of weaker quotations. The week's prices show no change and are nominal.

MORE INQUIRIES IN LOCAL MARKET

Several Changes Made in Prices—Steel Warehouses Getting Rid of Stock

TORONTO.—Inquiries can hardly be looked upon as the state of trade, but in the machine tool field they are looked upon as indicating a desire on the part of people to buy. During the last week or so there has been an increase in the number of inquiries sent in from the Ontario field, which for some of the houses has been rather backward in showing much improvement. "We think most of the inquirers mean business," was the remark of one of the dealers this morning. "As far as we can learn none of them has been in before in the way of an inquiry. The list is pretty well scattered, and there are no very large orders, but it is a hopeful looking move."

Some of the machine tool dealers are having a little trouble with payments, and a few of them have cases of cancellation where their only way out is to fight. For instance, one dealer had a machine cancelled on him after it had reached the city, and he had notified the firm that he was clearing it and would commence the erection on the following day. In this case the dealer refused to cancel, and the acceptance followed in the usual way.

POINTS IN WEEK'S MARKETING NOTES

A number of makers of machine tools of various kinds, also of motors, have announced reductions in their selling prices reaching from 10 to 20 per cent.

New York reports that the machine tool market is still very dull there, and also adds that a quantity of German made equipment has been disposed of to one of the large industrial concerns.

The Pittsburgh steel market seems to incline to the belief that the Steel Corporation prices will be revised when it becomes more urgently necessary that they wish to secure new business.

The local steel merchants have not made any change in their selling prices although when a fair sized order seems liable to be placed there is often a departure from the recognized price.

Some of the machine tool dealers report that they are receiving many more inquiries than for some time past. These inquiries for the most part are from new sources that have not been in the market before.

Scrap metal dealers are buying only very small quantities of copper. They are not taking anything in the line of iron or steel. The prices are still away down and then the lower schedule quoted is only nominal.

A new base price has been announced for wire nails and also for cut nails.

The tendency toward lower levels in the machine tool market is becoming more marked. On other pages of this week's issue of Machinery there are references to new prices on tools of several sorts. This paper has been notified by the makers of several lines that they are coming down 15 to 20 per cent. on the first of March.

Selling in Small Lots

Mostly pick-up trade is what the average dealer in small tools would tell you were he to describe the situation now. There are a few good orders coming into the market. For instance, the National Railways have specifications out for about \$5,000 worth of drills, mostly high speed, for the Moncton shops. This is the shop with which the dealers like to do business, as it has a reputation of being about the only one of the Government owned list to place orders promptly and make settlements in the same way.

Prices have been fairly firm in the small tool business for some time, and shading of prices is not resorted to—at least if it is it is done in such a way that it does not get a chance to become gossip in the machine tool market.

In the Steel Market

Dealers do not state that there have been any reductions made in prices yet, but it is a fact that there is a tendency to shade prices. This is always liable to happen when firms are out after business, and that is exactly what is happening now. Bar iron is still quoted at 4.75 base, but all the dealers know that there have been some exceptions to that price. The price is based on present mill prices, but the eagerness to secure any business that comes up blinks at these things now and then.

Boiler tubes are moving out a little better this week, although the season on the whole will be only a fair one for this line.

Some of the yards in this district are working hard to get rid of stocks, and prices are being placed pretty close to the limit in order to get in shape to take advantage of any better price schedules that may be brought out.

In some lines business is coming in better, but mostly in the small goods.

A new base price has been given for wire nails, the figure now standing at \$5.10, while cut nails are quoted \$5.75, f.o.b. Montreal. Copper rivets and burrs are also selling under a new list, dated February 7, showing quite a reduction.

The Scrap Metal Market

Business dull, prices only nominal—that tells the story of the scrap metal market this week. Dealers will hardly go to the length of stating they are out of the market entirely, a position they were prepared to take a few weeks ago. The chances are that one would find it fairly difficult to place a tonnage of iron or steel, unless at a runaway price, but it is possible that some of the yards would be inclined to take on small lots of copper. The chances are that the price of that metal will be one of the first to show signs of recovery when the tide turns definitely.

NEW PRICE STARTS ON FIRST OF MARCH

Landis Announce New Price That Is Down From 15 to 20 per Cent.

Canadian Machinery has received the following letter from T. H. King, sales manager of the Landis Tool Company: "Beginning with March 1, 1921, it is the intention of Landis Tool Company to make a general reduction in prices on all machines with the exception of the crankshaft grinding machine. This reduction will average 15 to 20 per cent. on our entire product with the exception noted."

SOME PRICES ARE ON THE WAY DOWN

New York Market Is Quiet. Although a Number of Reductions Are Named
Special to Canadian Machinery

NEW YORK, Feb. 17.—There have been price reductions during the past week at two on miscellaneous lines of metal working equipment.

The General Electric Company reduced motors about 10 per cent., and most of its competitors have followed suit.

Two makers of shapers reduced prices 15 per cent., following the same action by a Newark maker a few weeks ago.

A manufacturer of power presses in Brooklyn has reduced prices 10 to 15 per cent., and Rochester manufacturers of high-speed riveting hammers have reduced prices 10 per cent.

Other reductions include 15 per cent. by a maker of automatic gear cutting and riveting machines and 10 per cent. on oilstone grinders.

Business is very dull in most machine tool markets, though a slight improvement is noted here and there. The sentiment has improved in the automobile manufacturing section of the country, due to the speeding up of production at some of the plants.

The only large business in prospect which may be placed this week is a list required by the Santa Fe Railway, totaling about \$150,000, and a list of tools to be bought by the Ohio Locomotive Crane Company, Bucyrus, Ohio, of a like amount.

A few German punches and shears were bought a week or so ago by the Ohio Locomotive Crane Company.

PRICES REDUCED ON SEVERAL LINES

Mills Are Out Looking for Business and Prices Are Starting to Sag

Special to Canadian Machinery

PITTSBURGH, Feb. 17.—This week has shown the first definite break-away from the Steel Corporation schedule. Many buyers have refused to regard that schedule as final and they are feeling now that their belief has ground in fact.

The Midvale Steel & Ordnance Co. has instructed its sales offices to find out the prices at which orders can be secured and also has granted authority to take the business. The drive on the part of this company has resulted in definite offers of tonnages of the major products at well below the regular market quotations. Since the instructions were not written it is difficult to obtain actual information as to the prices named, but it has been verified that it named 2.25c., Pittsburgh, on shapes and bars.

Unverified reports have been current of quotations of 2c on bars and it also is rumored that the same price was named against a tonnage of plates in the Chicago district.

Other independent interests have done nothing in the matter of price cuts, but it is patent that in the event any business is uncovered by the company which is active in this respect the others will go along.

So far as can be learned the effort to interest buyers in purchases at practically their own prices has not been successful. This, however, was to be expected, in view of the fact that the first effect of a sudden reduction in prices usually is to make buyers cautious. The Steel Corporation subsidiaries meanwhile are holding to the level of prices which it has observed now for almost two years, and apparently they are content to wait to see what success attends the efforts of independent companies to secure business at lower prices before taking any action either as regards selling prices or wages. It is pretty well established that the cutting of prices by independent companies is to be accompanied by lower wages, and since the rates of Pittsburgh and Youngstown companies have not yet been disturbed it is figured that the acceptance of business at the prices named would involve a cut in wages of as much as 30 per cent. The market is even duller than it has been as a result of the apparent willingness of independents to consider lower prices, and prices are even more indefinite now than they have been at any time since the reaction in business set in last fall.

The recession in the activities of the Steel Corporation subsidiaries has been rather pronounced in the past week. The Carnegie Steel Co. has one less active blast furnace than a week ago, and while it has all of its ingot making capacity on except its Sharon, Pa., works, production is not over 90 per cent. of capacity, and finishing mills are not as fully engaged as they were recently. With new business on a very light scale as compared with completed tonnages, it is probable that before the end of the month total operations now averaging close to 90 per cent. will be below 80 per cent. The company at an early date will shut down its Columbus, Ohio, works, due to the lessened demand for sheet bars from the American Sheet & Tin Plate Co., which as far as sheets are concerned is not nearly so busy as it was recently. The American Steel & Wire Co. has experienced no improvement in business and its plant operations still are declining. The National Tube Co. is the one subsidiary organization which continues to run full.

The increases in independent steel company operations are only partly sustained, for new orders have not been coming forward in volume sufficient to offset those which have been completed.

The pig iron market reflects no increase in interest on the part of melters, although one large company in the week under review bought about 2,000 tons of foundry iron for early delivery.

Scrap Metal Market

The prices of scrap metal are steadier, as the downward trend is halted in some districts. The demand continues light.

Quotations in the Chicago district are remaining steady. Scrap for foundry use is in demand as founders seek to average their high-priced pig iron. Railroads are offering tonnages.

On the Boston market several sales of No. 1 machinery scrap have shown an improvement in price. One Massachusetts foundry bought four cars at \$25.50 del. A sale was made of several cars of stove plate at \$15 del.

The steadiness of the scrap metal at New York is reported to be due more to lack of buying than any improvement in sentiment. There is very little inquiry from consumers.

Heavy melting steel has weakened on the Buffalo market and is now quoted at \$15 to \$15.50, with little selling. There is no sign of a buying movement.

Pittsburgh reports that some railroad scrap is being purchased occasionally. The Pennsylvania railroads offerings in the territory aggregate around 18,000 to 20,000 tons. One iron works is said to be in the market for 1,000 tons of heavy melting steel, but is offering only \$12 and dealers and brokers' claim to be unable to buy at \$15 to \$16. Releases on old scrap contracts continue to be difficult to obtain.

The market at Cleveland is absolutely devoid of activity. Consumers are not buying, shipments are not being accepted by mills, and the market is such that exchanges between dealers have practically ceased.

The trend of the St. Louis market is downward, several reductions being made during the week. The new quotation in rerolling rails is now \$15.50 to \$16. Steel car axles dropped \$1.50, now being quoted at \$19 to \$19.59, and wrought grades, knuckles, couplers, locomotive tires, springs and steel angle bars were reduced 50 cents each. Dealers who recently bought scrap are discouraged. An inquiry was made for 3,000 tons of re-rollers from an Indiana interest.

Birmingham reports that trading in the southern scrap iron and steel market is insignificant. Little change is expected within the next 60 days. The larger dealers are adding to their stocks. Quotations are unchanged, though the market is weaker.

It was stated at the annual meeting of the International Railway Fuel Association at Chicago that the life of a boiler fired with coal is about 10 per cent. greater than one fired with oil, while the life of the tubes is about 40 per cent. higher in the coal burners. This statement is the result of experience gained on the Santa Fé system where one-half of the locomotives have been constructed or converted to burn oil.

How to Get the Employees to Tell "Why,"

Plan Adopted at the Dodge Plant to Learn What the Men Thought of the Firm—Prizes For Telling Why They Stayed and What They Liked and Disliked

By HARRY BOTSFORD, Publicity Manager Dodge Mfg. Co.

PERHAPS the most difficult problem the man in charge of personnel work has to contend with is to get a definite worth-while expression from the employee of just what he thinks of the various forms of welfare work and of the organization that employs him. This was exactly the situation Doctor W. A. Moore, manager of industrial relations for the Dodge Manufacturing Company, of Mishawaka, Indiana, ran up against.

There were six questions which puzzled Doctor Moore and the six questions which puzzled him are questions that might well be asked in every organization, whether or not that organization is of sufficient size to warrant the employment of a highly trained personnel man.

The six questions which perplexed were: What is the Dodge spirit? Why do so many stay so long with Dodge? How can we get the old Dodge spirit into new men? How does an old Dodge man feel about the company? What are the impressions of a new man? And, how can we attract and hold the kind of a man who will stick?

Here were six vitally important questions—a knowledge of the answers would be of manifest advantage not only to the manager of industrial relations but to the entire organization.

At last the idea came to carry out a prize contest in the Dodge News, our weekly internal house organ. Announcement of the contest was very brief and the rules governing were made just as fair as possible. Any employee was eligible; one subject could be selected and the answer was not to contain in excess of 1,000 words. No names were to be signed to any paper but the name, department and clock number of each contestant was to be written on a separate sheet of paper, enclosed in an envelope and attached to the entry. Three prizes were offered: \$25, \$10 and \$5.

The judges of the awards were the manager of industrial relations, the office manager, the superintendent of one of the shop departments, the manager of branch offices, the editor and assistant editor of the Dodge News and the writer. Each of the judges read all of the many papers turned in and selected the three he believed to be the best and wrote out his selection and placed it in a sealed envelope, each making his decision independently of all the other judges. This assured absolute fairness in judging.

When the judges' decisions were compared it was found that the first prize was awarded to a worker in the steel shop who had chosen to give the impressions of a new Dodge man. This man had been a "boomer" and an industrial

drifter all of his life but had decided that he liked the organization so well that he was going to stick. To say that the ideas he advanced were valuable to the manager of industrial relations is to put the matter mildly. For an organization to have something in it which will make a solid citizen and a steady worker out of a "boomer" is one thing, but to know what brought about the metamorphosis is several things. For example, we found this man liked our commissary where we sell groceries and clothing to our employees at cost; he enjoyed the benefits of our relief association, he had saved money through our thrift club; he had particularly enjoyed the advantages of our employees' club, our cafeteria and the Dodge News. He was especially grateful for the treatment accorded him by his superiors and of the general spirit of good-fellowship and co-operation between all units of the organization.

The second prize went to one of the office men who told how we could attract the kind of men who will stick. The suggestions advanced were excellent and sensible in every sense. The manager of industrial relations secured many worthwhile ideas from this paper.

The third prize was from a member of the order department who has been with the organization for over twenty years. Naturally, this man selected as his subject why so many stay so long with Dodge. He treated his subject in rhyme but nevertheless it was a sane and sensible text which covered the entire subject.

We are now running in our internal house organ the papers of the winners and of those who secured an honorable mention. These papers are read by the employees each week with great interest.

The contest has been worth-while from every standpoint. We secured the opinions of the workers on some matters which have been bothering us for some time. The opinions, in every case, were more frank and open than they would have been otherwise. The use of the prizes has more than justified the small expenditure required to put the idea across.

What we have accomplished is possible for any other organization to do; we have found out what our workers think of us, our plants, our ideals, and welfare plans. We have secured several valuable hints and ideas which will eventually develop into some changes in our present welfare and personnel work.

We believe the contest idea is well worth the time and money spent. The number of entries were large and an-

swers came from our branches from Seattle, Wash., to New York City, which has proven to us the interest the employees take in our organization.

Pig Iron Markets

On the Pittsburgh market one company has closed for 2,000 tons of foundry iron for prompt delivery to its Pittsburgh district plants, the iron running in equal quantities from 1.75 to 2.25 silicon and 2.50 to 2.75 valve yfurnace, the former at \$28 and the latter at \$29.25.

Pig iron has shown further weakness on the Chicago market and southern foundry has dropped to \$27.50 base Birmingham. The leading steel interest still has 22 furnaces in blast, but has reduced its steel making to about 80 per cent. capacity and is rolling finished material at 75 per cent. rate. One new blast furnace was blown in today.

The tendency of the New York market is downward. A Bridgeport melter purchased 1,000 tons of foundry and 500 tons of malleable, the price of the foundry iron is understood to have been less than \$30 at furnace.

In Pittsburgh district one local house reports a sale of 750 tons No. 2 Pennsylvania foundry iron; to be delivered within three or four months, at a price around \$30 furnace. One company is reported to have bought 1,200 tons silicon 1.75 to 2.25 Eastern at about \$28 at furnace.

Improvement is shown on the Buffalo market both in inquiries and active orders. One producer reports orders for 5,500 tons being booked, also many inquiries. Car wheel manufacturers are said to be ready to come into the market and considerable business is expected to come from this source. Another sale was made of 800 tons at \$30. No sales at less than \$30 have been reported.

Severe dullness marks the St. Louis market. A few small sales have been made but no general market established.

A little activity in foundry iron is shown in the Cleveland district, and prices have settled down to \$29 and \$30 for No. 2 foundry.

An inquiry for 5,000 tons of basic iron has been received from a steel plant in the Cincinnati district and expectations are that part of the order will be placed.

While there have been reports of sales of foundry iron on the Philadelphia market at less than \$30 furnace, these have not been confirmed. Only seven Eastern Pennsylvania furnaces are in blast with 26 out.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Open hearth, Pittsburgh	\$32 45
Open hearth, base, Montreal, Chicago	40 50
Open hearth, base, Philadelphia	33 25
Bessemer, Pittsburgh	33 96
Basic, Valley furnace	30 00
Toronto price	
Sharon, 2.25% to 2.75	39 25

IRON AND STEEL

Per lb. to Large Buyers	Cents
Open hearth, base, Pittsburgh	\$ 4 75
Steel bars, base, Toronto	4 75
Iron bars, base, Montreal	4 50
Steel bars, base, Montreal	4 50
Reinforcing bars, base	4 75
Steel hoops	6 00
Tire steel	5 00
Spring steel	8 00
Band steel, No. 10 gauge and 3-16 in. base	5 50
Chequered floor plate 3-16 and heavier	7 50
Bessemer rails, heavy, at mill	2 35
Steel bars, Pittsburgh	3 00-4 00
Tank plates, Pittsburgh	3 50
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	5 00
F.O.B. Chicago Warehouse	
Steel bars	3 48
Structural shapes	3 58
Plates	3 78
Small shapes under 3-in.	3 48

FREIGHT RATES

	Per 100 Pounds	C.L.	L.C.L.
Pittsburgh to Following Points			
Montreal	58 1/2	73	
St. John, N.B.	84 1/2	106 1/2	
Halifax	86	108	
Toronto	38	54	
Guelph	38	54	
London	38	54	
Windsor	35	50 1/2	

METALS

	Gross	Montreal	Toronto
Lake copper	\$19 00	\$17 50	
Electric copper	18 50	17 50	
Castings, copper	18 00	18 00	
Tin	44 00	40 00	
Spelter	8 00	7 50	
Lead	7 25	7 50	
Antimony	8 00	8 25	
Aluminum	34 00	30 00	

Prices per 100 lbs.

PLATES

Plates, 3-16 in.	\$ 5 50	\$ 5 50
Plates, 1/2 up	5 00	5 50

PIPE—WROUGHT

Standard Butt-weld Pipe

Per 100 Ft.

	Steel	Gen	Wrought Iron
	Blk.	Galv.	Blk.
8" 70	8 50	9 51	8 01
8" 71	8 51	9 52	8 02
8" 72	8 52	9 53	8 03
8" 73	8 53	9 54	8 04
8" 74	8 54	9 55	8 05
8" 75	8 55	9 56	8 06
8" 76	8 56	9 57	8 07
8" 77	8 57	9 58	8 08
8" 78	8 58	9 59	8 09
8" 79	8 59	10 00	8 10

Standard Lap-weld Pipe

Per 100 Ft.

	Blk.	Galv.
63 11	76 83	70 76
	92 46	85 10
		100 83
		1 30
		1 52
		1 97
	2 66	2 66
	3 07	3 07
	3 67	3 67
		1 10

Prices—Ontario, Quebec and Maritime Provinces

WROUGHT NIPPLES

4-in. and under, 50 per cent.
4 1/2-in. and larger, 40 per cent.
4-in. and under, running thread, 20%
Standard couplings, 4-in. and under, 20%
Do., 4 1/2-in. and larger, net.

OLD MATERIAL

Dealers' Average Buying Prices

	Per 100 Pounds	Montreal	Toronto
Copper, light	\$10 50	\$ 9 00	
Copper, crucible	13 00	11 00	
Copper, heavy	12 00	11 00	
CCopper wire	12 00	11 00	
No. 1 machine composition	13 00	9 75	
New brass cuttings	7 00	8 00	
Red brass turnings	8 00	8 00	
Yellow brass turnings	7 00	6 00	
Light brass	5 00	5 00	
Medium brass	6 50	6 00	
Scrap zinc	5 00	4 00	
Heavy lead	4 50	4 00	
Tea lead	2 50	2 00	
Aluminum	15 00	10 00	

	Per Ton	Gross
Boiler plate	\$11 00	\$12 00
Heavy melting steel	15 00	14 00
Axles (wrought iron)	25 00	20 00
Rails (scrap)	15 00	14 00
Malleable scrap	20 00	20 00
No. 1 machine cast iron	30 00	25 00
Pipe, wrought	8 50	8 00
Car wheel	30 00	25 00
Steel axles	20 00	18 00
Mach. shop turnings	8 00	6 00
Stove plate	23 00	20 00
Cast boring	8 00	7 00

BOLTS, NUTS AND SCREWS

	Per Cent
Carriage bolts, 7-16 and up	Net list
Carriage bolts, 3/8" and less	15
Coach and lag screws	—20
Stove bolts	55
Wrought washers	25
Elevator bolts	Net
Machine bolts, 7-16 and over	—5
Machine bolts, 3/8-in. and less	—30
Blank bolts	Net

Machine screws, fl. and rd. hd., steel	27 1/2
Machine screws, o. and fl. hd., steel	+25
Machine screws, fl. and rd. hd., brass	Net
Machine screws, o. and fl. hd., brass	Net
Nuts, square, blank	+25 add \$2 00
Nuts, square, tapped	add 2 25
Nuts, hex., blank	add 2 25
Nuts, hex., tapped	add 2 75
Copper rivets and burrs, list less	27 1/2
Burrs only, list plus	10
Iron rivets and burrs	37 1/2 and 5
Boiler rivets, base 3/4" and larger	\$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	67 1/2
Wood screws, flat, bright	67 1/2
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55 1/2
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47 1/2

MILLED PRODUCTS

(Prices on unbroken packages)

Set screws	Less 40%
Square and hexagon head cap screws	Less 30%
Round head cap screws	Plus 10%
Fillister head cap screws	Less 10%
Flat head cap screws	Net list
Button head cap screws	Plus 10%
Studs	Less 20%
Semi-finished nuts up to and including 1-in.	Less 35%
Semi-finished nuts 1 1/8 to 1 1/2	Less 30%
Semi-finished nuts 1 1/2 to 2 in.	Net list
Coupling bolts	Plus 10%
Taper pins	Less 40%
Planer bolts without fillet	Plus 40%
Planer bolts with fillet	Plus 50%
Patch bolts	Plus 80%
Hollow set screws	Plus 20%
Thumb screws	Less 35%
Thumb nuts	Less 65%

BILLETS

F.O.B. Pittsburgh.

	Per gross ton
Bessemer billets	\$43 50
Open-hearth billets	43 50
O.H. sheet bars	47 00
Forging billets	48 50
Wire rods	57 00

NAILS AND SPIKES

Wire nails, base	\$5 10
Ct nails, base	5 75
Miscellaneous wire nails	50%

ROPE AND PACKING

Plumbers' oakum, per lb.	0 10 1/4
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 26
British Manila rope	0 20
New Zealand hemp	0 20

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	Net
---	-----

Gould & Eberhardt

High-duty SHAPERS

16" - 20" - 24" and 28" sizes

Ask for Catalog and details describing the exclusive features.

We can give early delivery.

The A. R. Williams Machinery Co., Limited

Halifax, St. John, Montreal
Winnipeg, Vancouver

If it's Machinery--Write "Williams"

64 Front St. West
TORONTO

The Week's Events in Montreal Industry

M. W. Drayton, buyer for the Canadian Fairbanks-Morse Company, in Montreal, has been on a business trip to the States for the past week or more, visiting Chicago and other American cities.

T. S. Worthington & Co., engineers and adjusters, 58 St. Francis Xavier St., Montreal, will remove to more commodious quarters in the old Sun Life Building at 142 Notre Dame St., about the first of March. This company is the sole representative for Canada of the Metals Coating Company of Canada.

The Montreal General Tool Company, 2419 Notre Dame St. East, Montreal, are desirous of getting in touch with firms in the larger centers, for the manufacture of the Victor Radiators for the heating of residences, factories and office buildings. These radiators require only about one-eighth the volume of water as that used in the ordinary radiator, for the same heating capacity.

The Dominion Engineering and Construction Company has been organized for the manufacture of "Delco" machinery and "Viking" pumps. A plant has been established in Longueuil across the river from Montreal, and machinery

is now being installed. It is expected that the factory will be in operation within a short time. A. G. Kidston & Co., 17 St. John St., have been appointed the Canadian selling agents.

The Grand Trunk Point St. Charles shops in Montreal will be closed during the present week, for the purpose of overhauling the power equipment, general transmission and air compressors. A complete inventory has been taken recently of every machine and piece of equipment, and also the buildings, for the information of the arbitration board now sitting in Montreal, in connection with the handing over of the road to the Dominion Government.

The Engineering & Sales Service Co. of Montreal are now well established in their new premises at 179 Duke St. In addition to their sales service the company are acquiring machinery and equipment for the carrying on of a general jobbing and repairing business. It is expected that the company will be manufacturing Promet here in Montreal in the course of a few weeks. For the past couple of years the Engineering Sales & Service Co. have been the sole Canadian distributors for this metal.

Roy M. Wolvin, president of the Dominion Steel Corporation, has returned from England, where he has been in conference with officials and others interested in the steel merger, but no immediate announcement will be made as to what has been decided regarding the early developments of the British Steel Corporation. Regarding the Dominion Steel Corporation's connection with the proposed merger the president remarked: "Matters have not yet reached a point where any definite statement affecting the affairs of the company can be made."

At the fourth annual meeting of the Montreal Branch of the Canadian Division of the Aerial League of the British Empire, which was held at the Ritz-Carlton Hotel, in Montreal, last week, the name was changed to the Aerial League of Montreal, owing to the disbanding of the parent league. A review of the past year's work, which included the establishment of the Montreal Air Harbor, were given by the Commodore, A. E. Ty-lee, and other officials of the league. Sir Arthur Currie was elected president for the coming year, and after the election of officers, he gave an interesting address, briefly outlining the objects of the league and the possibilities of the future.

MISCELLANEOUS

Solder, guaranteed	0 29½
Welding	17 00
1 cwt.	15 00
Gasoline, per gal., bulk	0 42
Pure turp., single bbls., gal.	1 20
Linseed oil, raw, single bbls.	1 00
Linseed oil, boiled, single bbls.	1 03
Whiting, plain, per 100 lbs.	3 00

CARBON DRILLS AND REAMERS

S.S. drills, wire size	40 and 5
Can. carbon cutters, plus	10
Standard drills, all sizes	40 and 5
3-fluted drills, plus	10
Jobbers' and letter sizes	40 and 5
Ratchet drills	10
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	50
Sleeves	50
Taper pin reamers	25 off
Drills and countersinks	Net
Bridge reamers, carbon	50
Centre reamers	5
Chuckers reamers	Net
Hand reamers	10
High speed drills, list net to plus	20
Can. high speed cutters, net to plus	10
American	plus 40

COLD ROLLED STEEL

[At Warehouse]

Rounds and squares	\$7.00 base
Hexagons and flats	7.00 base

IRON PIPE FITTINGS

	Black	Galv.
Class A	60	75
Class B	26	36
Class C	17	26
Cast iron fittings, 5%; malleable bushings, 22½%; cast bushings, 22½%; unions, 37½%; plugs, 20% off list.		

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	\$ 7 50	\$ 7 50
Sheets, blue ann., No. 10	6 50	6 50
Canada plates, dull, 52 sheets	13 00	13 00
Can. plates, all bright	14 00	
Apollo brand, 10% oz.		
Queen's Head, 28 B.W.G.	13 00	
Fleur-de-Lis, 28 B.W.G.	12 50	
Corbal's Best, No. 28		
Corborne Crown, No. 28		
Premier, No. 28, U.S.	10 00	10 00
Premier, 10% oz.	10 50	10 40
Zinc sheets	16 50	20 00

PROOF COIL CHAIN

(Warehouse Price)

	B
¾ in., \$13; 5-16, \$11; ¾ in., \$10; 7-16 in., \$9.80; ¼ in., \$9.75; ¾ in., \$9.20; ¾ in., \$9.30; ¾ in., \$9.50; 1 in., \$9.10; Extra for B.B. Chain, \$1.20; Extra for B.B.B. Chain, \$1.80.	

ELECTRIC WELD COIL CHAIN B.B.

¾ in., \$16.75; 3-16 in., \$15.40; ¼ in., \$13; 5-16 in., \$11; ¾ in., \$10; 7-16 in., \$9.80; ¼ in., \$9.75; ¾ in., \$9.50; ¾ in., \$9.30.	
---	--

Prices per 100 lbs.

FILES AND RASPS

	Per Cent
Globe	50
Victory	50
P.H. and Imperial	50
Black Diamond	27½
Black Diamond	27½
J. Barton Smith, Eagle	50
Monumental, Globe	50
Imperial, P.H.	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES

Size	Seamless	Lapweld
1 in.	\$27 00	\$ 27 00
1½ in.	29 50	29 50
2 in.	31 50	29 50
2½ in.	31 50	30 00
3 in.	35 00	30 00
3½ in.	35 00	29 00
4 in.	42 00	37 00
4½ in.	50 00	48 00
5 in.	48 50	
5½ in.	63 00	51 50
6 in.	85 00	65 50

Prices per 100 ft., Montreal and Toronto

OILS AND COMPOUNDS

Castor oil, per lb.	—
Royalite, per gal., bulk	28
Palatine	31
Machine oil, per gal.	58
Black oil, per gal.	27
Cylinder oil, Capital	1.01
Petroleum fuel oil, bbls., net	11.2

BELTING—No. 1 OAK TANNED

Extra heavy, single and double	15%
Standard	15 and 10%
Cut leather lacing, No. 1	2 00
Leather in side	2 40 3 00

TAPES

Chesterman Metallic, 50 ft.	\$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	\$4 50
Polishing wheels, bull-neck	2 00
Emery in kegs, Turkish	8%
Pumice, ground	06
Emery glue	30
Tripol composition	9½
Crocus composition	12
Emery composition	11
Rouge, silver	64
Rouge, powder, nickel	38

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	8½
Grits, 80 and finer	6

BRASS—Warehouse Price

Brass rods, base ½ in. to 1 in. rod	30
Brass sheets, 24 gauge and heavier, base	38
Brass tubing, seamless	42
Copper tubing, seamless	44

WASTE

XXX Extra	.21	Atlas	...19
Peerless	.22	X Empire	...15
Grand	.21½	Ideal	...18
Superior	.21½	X Press	...13½
X L C R	.16½		

Colored

Lion	...13½	Popular	...10½
Standard	...12	Keen	...9
No. 1	...14		

Wool Packing

Arrow	...35	Anvil	...22
Axle	...28	Anchor	...17

Washed Wipers

Select White	.20	Dark colored	.09
Mixed colored	.10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard	...10%	Best grades	...15%
----------	--------	-------------	--------

ANODES

Nickel	...55 to .60
Copper	...38 to .40
Tin	...70 to .70
Zinc	...16 to .17

Prices per lb.

COPPER PRODUCTS

	Montreal	Toronto
Bars, ½ to 2 in.	\$35 00	\$37 00
Copper wire, list plus 10%		
Plain sheets, 14 oz., 14x60 in.	40 00	44 00
Copper sheet, tinned, 14 x 60, 14 oz.	43 00	46 00
Copper sheet, planished, 16 oz. base	47 00	50 00
Braziers', in sheets, 6 x 4 base	39 00	42 00

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	\$10 50	\$14 50
Sheets, 3½ lbs. sq. ft.	10 25	14 00
Sheets, 4 to 6 lbs. sq. ft.	10 00	13 50
Cut sheets, ½ c per lb. extra.		
Cut sheets to size, 1c per lb. extra.		

PLATING CHEMICALS

Acid, boracic	...25
Acid, hydrochloric	...03¾
Acid, nitric	...10¼
Acid, sulphuric	...03¾
Ammonia, aqua	...20
Ammonium, carbonate	...23
Ammonium, chloride	...22
Ammonium, hydrosulphuret	...75
Ammonium sulphate	...30
Arsenic, white	...18
Copper, carbonate, annhy.	...35
Copper, sulphate	...10
Cobalt, sulphate	...20
Iron perchloride	...62
Lead acetate	...30
Nickel ammonium sulphate	...16½
Nickel carbonate	...30
Nickel sulphate	...17½
Potassium sulphide (substitute)	...40
Silver Chloride (per oz.)	...1.15
Silver nitrate (per oz.)	...1.10
Sodium bisulphate	...13
Sodium carbonate crystals	...04
Sodium cyanide, 127-130%	...39
Sodium hyposulphite per 100 lb.	...6.50
Sodium phosphate	...15
Tin chloride	...80
Zinc chloride, C.P.	...30
Zinc sulphate	...08

Prices per lb. unless otherwise stated

Make Screw Cutting the Most Satisfac- tory Operation in Your Shop

Others have done so by equipping with

Geometric Screw Thread Cutting Tools

Wherever Screw Machines and Turret
Lathes annex a Geometric Die Head or
Collapsing Tap,

P
R
O
D
U
C
T
I
O
N
G
O
E
S
U
P
A
N
D
S
G
O
E
S
D
O
W
N

Prove for Yourself

what a Geometric installation will do for
you.

Tell us the specifications of your work, and
the kind of screw machine used, and we
will make you a proposition.

THE GEOMETRIC TOOL CO.

NEW HAVEN, CONN.

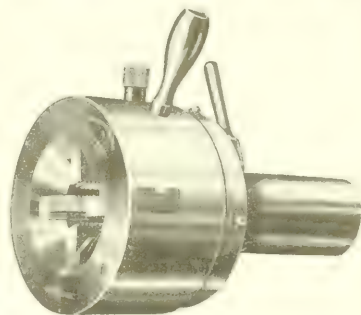
Canadian Agents:

Williams & Wilson, Ltd., Montreal
The A. R. Williams Machinery Co., Ltd., Toronto,
Winnipeg, St. John, N.B., and Halifax, N.S.

Canadian Fairbanks-Morse Co., Ltd., Manitoba, Saskatchewan, Alberta

FREE TO YOU

Geometric Die Heads



Instructions for
Their Care and Use

HAVE you one of these pamphlets on the
Care and Use of Geometric Die
Heads?

**YOU WILL WANT THIS BOOKLET
SOMETIME**

Are you using Geometric Die Heads?

YOU WILL WANT IT NOW

If not using Geometric Die Heads now, you
will want it later, when

YOU DO USE GEOMETRIC DIE HEADS

It is a small 11-page pamphlet, 6 in. x 4½
in., which tells you how to take care of your
Die Heads.

WRITE US FOR YOUR FREE COPY

A post card request will bring the booklet to
you, and placed in the hands of the man who
uses the Die Heads, it will help

CUT DOWN EXPENSE

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

NEW ADDITION TO CHATHAM PLANT

Chatham Malleable and Steel Manufacturing Co. Extend Their Premises

An addition to the plant of the Chatham Malleable and Steel Manufacturing Company, Limited, manufacturers of automotive and hardware specialties and sanitary stable equipment at Chatham, Ontario, is now complete, and the necessary machinery is now being installed. The addition is a one-story, heavy timber frame building, 36 x 100 feet, constructed on a cement foundation, and with a cement floor. Its principal use will be for assembling room and stockroom, but some manufacturing processes will also be carried on in it. The estimated cost is in the neighborhood of \$5,000. It will mean a material increase in output as lack of room has hitherto been something of a handicap.

The company report satisfactory conditions in their business. Their plant has been working on full time all winter and orders in hand and prospects seem to warrant the expectation that this will continue for the balance of the season.

ECHO OF THE WAR DAYS COMES UP

Hannevig Said To Owe Large Sum To Local Shipbuilding Concern

According to an announcement from New York, Hannevig & Co., a banking, foreign exchange and shipping concern, which was interested in the Dominion Shipbuilding and Repairs Co., of Toronto, has gone into the hands of a receiver.

The appointment of a receiver followed the action of Osler Wade, assignee of the Dominion Shipbuilding and Repairs Co., in seeking to collect \$887,105 which Christopher Hannevig is said to owe the defunct concern.

It was claimed that Hannevig has large assets and liabilities in Norway and a receivership is necessary to prevent the dissipation of the assets of Hannevig & Company.

The receiver issued a statement to the effect that the trouble which Hannevig & Co. found themselves in was due to the delay of the United States Shipping Board in adjusting its obligation with Hannevig & Co. Mr. Hannevig said his creditors would be paid in full as soon as the settlement was made.

READY TO FIGHT THE CANCELLATION

What One Toronto Dealer Has to Say in Regard to This Abused Practice

THE business of cancelling orders after they have been placed and finished by the makers is a hard one to deal with. That, at least, is the conclusion of one Toronto dealer.

Referring to the practice which has become such a common one in many circles in this country he stated that only a short time ago he had a cancellation sent to him and decided that the proper thing would be to fight the matter in the courts and find out if there were anything binding to a firm's signature on the strength of which he had gone ahead and undertaken serious obligations.

"The machine was from five to six thousand, and the order was taken some time ago. Only a short time ago one of the members of the firm was in the office, and I mentioned that the machine was here and we were clearing it. Erec-

tion in his plant would be undertaken in a day or so.

"The next thing that happened was the receipt by us of a hurry-up letter of cancellation. Business was not as good now as when the order was placed, but later on the machine would be needed. The idea was that we were to be made part of the getting-out system. There was nothing left for us to do but stand pat, and go to court, with the idea of finding out exactly where we stood. The result was that delivery was made.

"A dealer must protect himself in some way, and it seems to me that such a matter is only one of many that an organization of machine tool dealers could deal with. Why could they not frame up certain standards of practice, which would include decent methods of doing business, and have a uniform attitude toward the cancellation business. It seems to me that we must attempt to work toward the idea that a contract is a contract—that it is a moral obligation, signed, sealed and delivered, and backed up by the firm's name. If we cannot depend on such a document, then what is there we can depend upon?"

HAS FAITH IN THE ELECTRIC ROADS

Railway Engineer Quotes Figures That Show Where Savings Would Be Made

London.—The superior financial and operating advantages, together with the coal problem, will eventually compel the electrification of all Canadian railways, D. M. Morrison, chief engineer of the London & Port Stanley Railway, told the Rotary Club. Mr. Morrison declared that the electric locomotive is capable of working 24 hours a day seven days a week; that an electric railway can haul a third more freight than a steam road on this continent, and that maintenance of way charges are 50 per cent. less when electric locomotives are used. He stated that if all the steam roads in the United States were electrified the saving in coal annually would amount to 122,500,000 tons.

A factory building has been leased by Eckensweil and Harkley, Walkerton, Ont. After being remodelled and equipped it will be used for the manufacture of cement tile.



T. J. MCFADDEN

T. J. McFadden has joined the Western Ontario sales staff of the Diamond Stake Fibre Co. of Canada, with headquarters in Toronto. Mr. McFadden has had both executive and factory experience with the company before joining the sales force.

ATKINS

METAL CUTTING SAWS

Solve your Metal Cutting problems,
easily, quickly and economically, by
adopting the products made by

ATKINS

We make Kwik-Kut Power Hack Saw Machines which use practically the full cutting edge of the Hack Saw Blade at each stroke; Metal Cutting Band Saw Machines for general shop work, cutting all classes of metal up to 12 x 14 inches.

Your requirements for Metal Cutting Circular Saws can be supplied promptly and we solicit a trial of our "AAA" Non-Breakable and Power Hack Saw Blades and Frames.

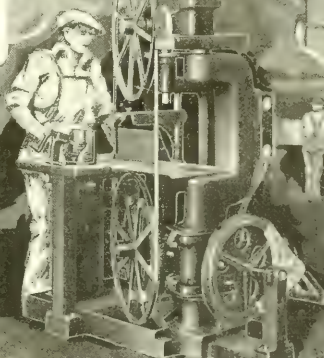
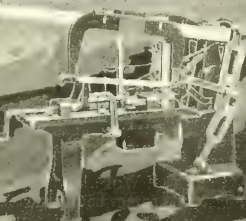
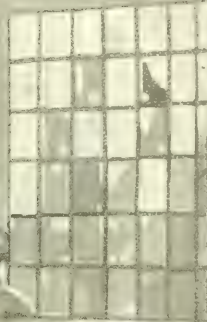
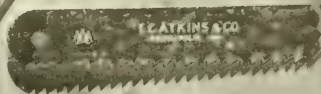
"A Better Saw for Every Use"

E. C. Atkins & Co.

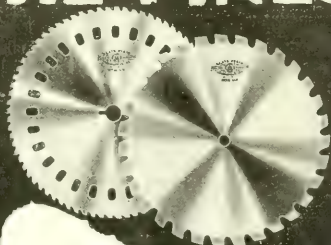
Established 1857

"The Sterling Quality Saw People"

Factory: HAMILTON, ONT. Branch: VANCOUVER, B.C.



THE FINEST ON EARTH



HIS PREDICTION OF WHAT IS LIKELY TO HAPPEN DURING 1921

WHEN THE COMMERCE AND INDUSTRY of the Dominion are likely to be affected by the conditions in the foreign market, it is not the immediate present. It is not a matter of course to say that ultimately things will be all right, and that conditions are fundamentally sound, or something of that sort.

But Arthur S. Dewing, of the Department of Economics, Harvard University, goes one better than that. He takes the year as it is coming to him, and forecasts the high spots. It was in 1916 that he wrote a post-war prediction that he wrote the Yale Review, and that he had said that some time in the past year that what he has to say of 1921 carries some weight. Here are his views summarized:

(1) Buying public will continue to demand reduction in prices on commodities above pre-war prices.

(2) Retail merchants will buy sparingly by reason of high interest rates and feeling of uncertainty regarding their customers' attitude.

(3) European countries will not increase their purchases beyond bare necessities and will make strenuous efforts to increase their exports.

(4) The forces that have brought about decline in prices and wages will continue to operate and general course

of commodity prices will be toward lower basis.

(5) Certain basic materials like copper, tin, cotton, hides and rubber will not decline much below present values and copper will be the first to feel the effects of better conditions.

(6) Basic commodities like steel, lumber, hogs and cereals will go lower and pig iron will reach its lowest level by midsummer, but fabricated steel products will probably continue to decline throughout the year.

(7) Retail prices of goods produced from these basic commodities may be expected to continue to fall throughout the year. Copper, cotton, and woollen manufactured articles, for example, may very probably sell to the consumer for higher prices by next winter owing to the exhaustion of the stocks of the raw material, but the general reduction in the retail merchant's overhead expenses coupled with the keenest kind of competition among retailers may keep down even these prices.

(8) Interest rates, profits and wages are destined to fall steadily during the year. That wages and profits decline during a period of falling prices is merely the converse of the proposition that they rise during rising prices, and the truth of this is all too clearly before us from the experience of the last few years.

The Blashill Wire Machinery Co., Montreal, is looking for a local site to establish a plant for making wire fencing. A new type of fence making machine has been designed by A. E. Blashill and the company have been planning the establishing of a plant for two years, but owing to the difficulty of securing raw material the plans were for the time abandoned.

Must Quit Union.—Twenty-two electricians, mostly outside linemen, employed by the Winnipeg City Light and Power Department, were suspended and paid off for failure to comply with the order of J. G. Glasco, manager, that they sever their connection with the Electricians' union. The men, it is understood, will be given a day or so to comply with this order, failing which they will be permanently dismissed.

Sold the Plant.—Canadian Car and Foundry Company has recently disposed of its Rhodes Curry plant at Amherst, N.S. The plant was not in any degree a vital part of the Car Company's organization and its disposal will enable the Car Company to enter 1921 in a stronger liquid position than otherwise would have been the case. The remaining plants of the company are capable of caring for the unusually large volume of orders now booked.

Build \$30,000,000 Bridge.—At a meeting of upward of 200 officers of the R. T. Scott Co., Ltd., at the Prince George in Toronto, announcement was made that this Toronto house has secured the financial contract to raise the \$30,000,000 required for construction of the Detroit-Windsor bridge, the bond issue being in \$30,000,000 seven per cent. preferreds and an equal amount of common bearing eight per cent. Three years is the selling period. Announcement was made of the opening of ten new branches, two of them here.

Will Pay Dividend.—Contrary to somewhat generally held expectations, no statement was given out at the conclusion of the meeting of the board of directors of the Dominion Steel Corporation, held in Montreal. It is understood that the chief business considered was composed of details in connection with the amended plan to merge the two steel companies, the Dominion and Scotia, with the possible inclusion of the Halifax Shipyards, Limited, and the Maritime Nail Company, of St. John. The one development of public interest was the announcement that the directors had declared the usual quarterly dividend of 1½ per cent. on Dominion Steel Corporation common stock payable April first to shareholders of record March fifth next. The regular 1½ per cent. disbursement on the preferred stock of the Dominion Iron and Steel Company was also declared, payable April first to record March 15th next.

CAN UNDERSTAND FROM PICTURES

Canadian Machinery a Welcome Visitor
at the Trade Commissioner's
Office

Wendell McL. Clarke, Trade Commissioner to Italy, will be leaving for that country again in a few weeks, having been in the Dominion for the past two months. Mr. Clarke believes there is good business to be done there and intimates that reports of industrial conditions, strikes, etc., were very much exaggerated.

"Canadian Machinery," he remarked, "is of great assistance, and although it is printed in English, the illustrations in the reading matter and in the advertising pages enable the people to see just what many lines look like. Many of the Italian people are surprised that such papers are turned out in Canada. They are of great assistance in furthering Canadian trade in foreign lands."

A refinery will be built by the Royal East Duke Oil Co., 171 St. James St., Montreal.

Trade Gossip

Captain Fatally Injured.—Captain Kenneth McKenzie, of Tiverton, was fatally injured at his home in Tiverton, nine miles from Kincardine. He went down into his cellar to look at the acetylene plant, which had not been working properly the night before, and it is surmised that he lit a match, for there was a heavy explosion, and part of a match was found on the floor. He was found with his skull crushed in and both arms broken. He died as he was being carried upstairs.

Make Disc Wheels.—The National Engineering Company, Limited, of Sarnia, Ontario, who manufacture air compressors, automobile tire pumps and machine tools of various types, intend to add disc wheels to their list of products in the near future. The National Engineering Company are one of Sarnia's newer industries. Their plant has been in operation since April, 1920, and at present from twelve to fifteen men are employed. The company's capitalization is \$150,000 and the officers are: J. W. Lawrence, president and general manager; W. A. Swan, vice-president and factory manager; and J. E. B. Phelps, secretary-treasurer.

Aikenhead's

Canada's Leading Tool Supply House

When you want tools, think of Aikenhead's. Let us make good our boast that we can supply you with "Anything in Tools" **promptly!**

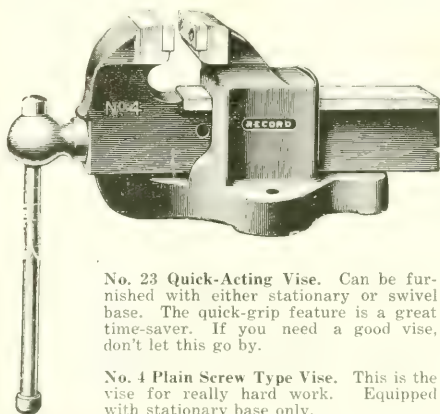
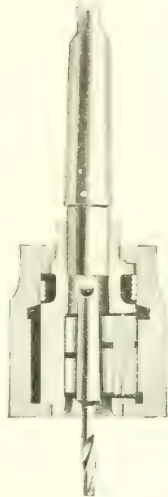
The Wahlstrom Drill Chuck

Keyless and Colletless. Never Slips

With a Wahlstrom your operator can drill any number of holes of different diameter one after the other simply by grasping the chuck with on hand and replacing the loosened drill with another—and **two seconds does it.** It is not even necessary to stop the spindle.

This Wahlstrom Automatic self-centres the tool perfectly and its instant-acting jaws close on the entire shank in a grip that becomes firmer as the resistance to the tool increases. The clutch can't slip and the jaws never mark a tool.

Made in two styles. One holds Nos. 1, 2 or 3 Morse Taper Shank Tools—with or without tang. The other is made in three sizes: 15-64 in. to 1/2 in.; 3/8 in. to 3/4 in., and 17-32 in. to 1 in., thus holding all sizes of straight shank tools from 15-64 in. to 1 in. Booklet upon request.



"Record"

Mechanics' Vises

"Record" Mechanics' Vises are strong, reliable tools which can be depended upon to stand the rough abuse which is the usual lot of a vise. They are made of the best grey iron castings. This is your opportunity to secure a high grade English Vise at a remarkably low price. Ask for fuller description and price list.

No. 23 Quick-Acting Vise. Can be furnished with either stationary or swivel base. The quick-grip feature is a great time-saver. If you need a good vise, don't let this go by.

No. 4 Plain Screw Type Vise. This is the vise for really hard work. Equipped with stationary base only.

Aikenhead Hardware, Limited

17 Temperance Street, Toronto, Ont.

CLEANING SCRAP METALS FOR CASTING

Scrap metal may be obtained in a variety of ways. It may be obtained from scrap metal, and this way they may be melted and cast direct or have to be made into ingots and re-melted as the level color is required, as with brass, either very careful sorting or melting in large quantities and casting into ingots becomes necessary, a large natural draught air furnace usually being selected for this class of work.

The scrap from factories, continues Practical Engineer, is usually fairly regular in character, but that collected from miscellaneous sources is generally more haphazard and has to be carefully sorted and cleaned. With iron and

metals and alloys it is an essential that all iron be picked out, and in fact all of these should be massed through a magnetic separator of some kind. Painted metals usually hold oxides of metal in the paint, which are reducible should they get into a bath of molten metal, and even when not reducible the paint base is likely to cause unsound metal unless removed. Zinc-coated iron should never be melted for making castings, and painted iron will at times cause trouble because the paint stock is not always quite destroyed or reduced in the furnace. Having as far as is possible cleaned and sorted the metal before melting, it becomes of some importance to clean it after melting, and here it is desirable to skim crucibles as soon as the metal melts, thus removing not only

dirt but nickel and the like with which the scrap may have been plated. To remove the oxides which may have become entangled with the molten metals, with aluminum and its alloys a flux of zinc chloride, with cupreous alloys a flux of sal ammoniac, and with iron either fluorspar, soda or ferro aluminum should be used in quantities as may be needed, unless some proprietary flux is preferred, and some of these things are very good indeed if used as the makers advise. Scrap does not answer for castings which have to stand tests, but for a large amount of work it is useful on account of its low price as compared with new metals.

Business Better.—Reports received by the directors of Ontario Steel Products Limited at a recent meeting showed that business was looking up. More orders were coming in, and business appeared to be looking brighter in every way. The plants at Chatham and Gananoque are said to be running at considerably more than half capacity, and there does not seem to be any reason to expect any change in the dividend policy.

Russian Business.—An undertaking for the repair of virtually all of Russia's locomotives, extending over a number of years, has been signed between the London firm of Armstrong, Whitworth and Company and the Russian Trade Delegation. Reports to this effect had been current for several days and the company has confirmed them. It announces that the contract is subject to the signing by Great Britain of the trade agreement with Russia.

N. L. Somers, assistant works engineer for the past four years with the Algoma Steel Corporation, is incorporating a company, with head office in Toronto, to engage in sales engineering and contracting. Power development and transmission supplies and equipment will be specialized in.

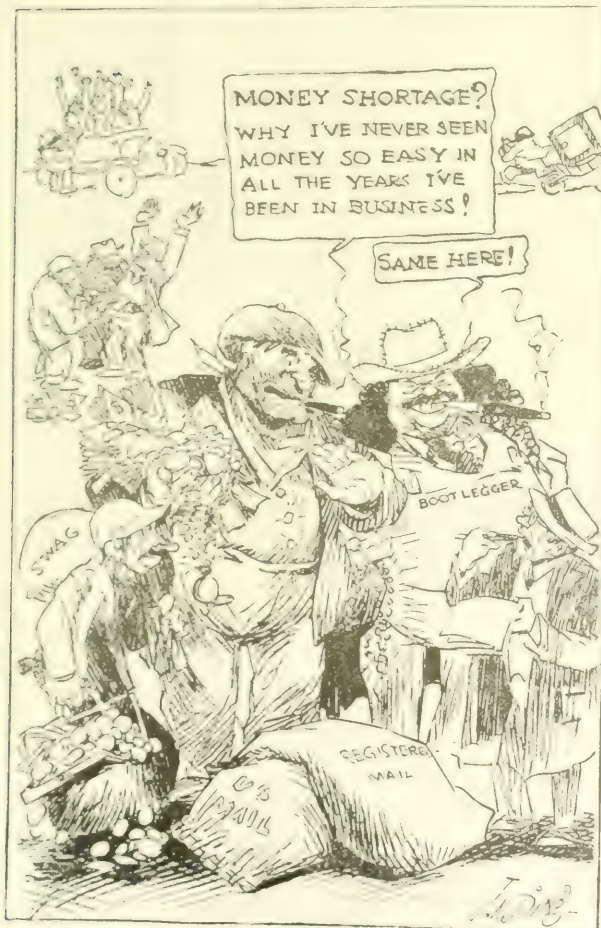
OBITUARY

The death occurred at Hamilton on January 27 of Robert McMurtrie, who for many years was a salesman for the Steel Company of Canada.

The death occurred at Toronto General Hospital on February 6, after a short illness, of Mr. James G. Cane, one of the city's leading lumber merchants. Mr. Cane had been in the lumber business in the city for thirty years as head of the firm of J. G. Cane & Company.

The death occurred at Goderich on January 31 of Capt. Alexander Lawson, one of the old-timers of the Great Lakes. He was a master of sailing vessels and has owned several. He was one of the original stockholders in Hutchinson's Flour Mill, now the Western Canada Flour Mills Company. Some years ago he promoted the building of the Masonic Temple on West Street, Goderich.

LOOK WHO'S GOT IT!



There is a growing suspicion that the newspaper reporters have not been interviewing the right parties!

Dan Morgan "Register"



MORROW

*High
Speed
Forged
Drills*

The long life of Morrow Drills and their keen cutting edge is what makes them popular. It's in the steel, it's in the temper, it's in the knowing how!

Also manufacturers of Cap Screws, Set Screws, Semi-nuts, and sole distributors of P-H and Imperial Brand Files.

When ordering drills be sure to specify MORROW'S. There's a difference in your favor.

Please Note
Our New
MONTREAL
ADDRESS



John Morrow Screw & Nut Co., Limited

Ingersoll, Canada

John Morrow Screw & Nut Co., Limited

489 St. Paul Street West, MONTREAL, Quebec

Telephone: Main 8418

THE
"FLU"
Stayed out
of this
PLANT



PURO SANITARY
DRINKING
FOUNTAIN
(MADE IN CANADA)

Write
**Puro Sanitary Drinking
Fountain Co.**
888 F. St. Andre St., Montreal, P.Q., Canada



RATES FOR CLASSIFIED ADVERTISING

Rates (payable in advance): Two cents per word. Count five words when box number is required. Each figure counts as one word. Minimum order \$1.00. Display rates on application.

E. P. THOMAS REVIEWS WORLD CONDITIONS IN THE STEEL TRADE

E. P. Thomas, president of the United States Steel Products Company, the subsidiary of the United States Steel Corporation dealing with export business, spent a few hours in Toronto, during which a number of men interested in the iron and steel industry had the opportunity of meeting him at a luncheon arranged at the Toronto Club.

Discussing world conditions, Mr. Thomas had the experience of a long trip in Europe to draw from. "Many undertakings will be gone on with now that had been held up for years, fearing the outbreak of the German army and possible German domination. There is the railway in Mesopotamia to Bagdad, and other undertakings. During the years of the war a large amount of steel was withdrawn from commercial and industrial usage, and it is safe to say that now there is a shortage of fifty million tons of steel."

Neither Germany nor France nor Belgium was in a position yet to produce to anything like capacity. It would take France some time to take full advantage of her new iron ore and coal resources. Britain was finding difficulty also with labor troubles, and there would be a big export business from the American continent.

TRADE GOSSIP

Several prominent Masons of St. Thomas, Ont., are advocating the erection of a large Masonic temple there.

An addition to their present warehouse is being planned by the Waterloo Manufacturing Company, Saskatoon, Sask.

Joseph S. Johnson died at his home in Galt on February 13. He was an engineer with the G.T.R. for forty-five years.

It was strongly recommended at the annual meeting of the Lambton Farmers' Co-operative Association at Petrolia, Ont., that an elevator be built at that point.

A permit has been issued to the Barrett Company for two tar storage tanks of concrete construction at the southeast corner of Keating and Saulters Streets, Toronto, at a cost of \$20,000.

After a few weeks' illness at his home in Owen Sound, the death occurred of James McLauchlan. Mr. McLauchlan, who has been a resident of Owen Sound since 1871, was founder of the business now carried on by the McLauchlan & Sons, Ltd.

It has been stated by W. H. Shaw, head of the Shaw Business College, that he will likely erect a school building on property which he has purchased at 56 Wellesley Street. He is considering the erection of a building three or four stories in height, with all modern improvements.

The company of which he was head had such faith in the possibilities of the export business that they had gone ahead with the construction of 32 ten to twelve thousand ton ships, at a cost of from fifty to sixty million dollars.

Coming to the operations of the corporation at the plant at Ojibway, Mr. Thomas intimated that construction costs had been the chief obstacle in holding back the completion of this installation. They had already spent four million dollars there, but had hesitated in going ahead faster because the original estimate of twenty millions for the plant had come to look more like fifty millions. They were anxious as soon as possible to get under way in Canada, and to take their place as manufacturers in the Dominion.

For the long future Mr. Thomas had no fears, although for the immediate present he admitted that one man's guess was as good as another's. During his short stay in Canada he claimed he had unearthed even a better brand of optimism than was prevalent in many parts of the United States. Many of the problems following the war had been dealt with, and conditions were favorable to a resumption of normal business.

New Company.—Incorporation has been granted to the Canadian Production Tool Company, Walkerville, for the manufacture of production tools, etc. H. E. Walker is president of the new company and H. N. Reynolds secretary-treasurer.

A plant will be erected by the M. N. and R. Fishing Company, in the near future, at or close to Prince Rupert, B.C.

The Ford Motor Company has reopened its plant at Highland Park, and is producing at 25 per cent. of capacity. The plant will operate on a three-day-a-week schedule at the outset.

The death occurred in Hamilton on January 9 of Miles O'Reilly Duff, who was, until the beginning of his illness a year ago, associated with the Dominion Bridge Works Company, of Toronto and Montreal, and also the Hamilton Bridge Works Company. He was a graduate in science of the University of Toronto, and a member of the Engineers' Institute of Canada.

PRICES AND WAGES GO HAND IN HAND

What Some of the Independent Producers Are Doing in Youngstown District

Youngstown, O.—Independent producers of steel in this district are breaking away from the United States Steel Corporation's prices under the lead of interests east and west. Cuts in quota-

tions ranging to \$7 a ton for galvanized are heard. The range through seems to be from \$4 to \$5 a ton. Some interests will decline to name prices that will cause a greater loss than suspension of operations.

A substantial cut in wages by independents in those districts that are still adhering to the quotations in effect by the United States Steel Corporation is at hand.

New independent steel prices heard are 2.40c to 2.45c base for plates, 2.25c base for bars, 4.25c base for black sheets and 5.25c to 5.50c for galvanized, as low as 2.15c on bars and 5.40c on galvanized is heard.

Personals

J. A. Evans has accepted the position as office manager with the Canadian Hart Products, Ltd., Hamilton, Canada. For several years past Mr. Evans has been with the Victor Saw Works at Hamilton.

James McGill, engineer on the Steamer Mallon, of the Matthews Steamship Company, whose home is at 44 Smith Street, Toronto, died at Cornwall on January 31, from injuries receiving by falling into an open hatchway on the vessel.

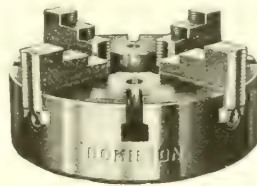
Ready to Start. The plant of the Carbon & Alloy Steel Company at Fraser, Ont., is nearing completion and, it is expected, will be in operation by March 1.

New Sales Office.—The city sales office and show room of the Dodge Mfg. Co., Ltd., is being removed to the new Aladdin building, corner Simcoe and King Sts. They will occupy the entire ground floor.

Getting Canadian Plate.—What is stated to be the first shipment of steel plates of appreciable width from the Maritime Provinces to the Toronto district has arrived in Toronto. The shipment consisted of three carloads of steel plates, eighty-five inches wide, manufactured by the Dominion Iron & Steel Corporation, of Sydney, Nova Scotia, and transhipped via the Canadian National Railways to the Toronto Iron Works. Hitherto local firms have been obliged to order steel plates of this size from the big mills in the United States, and the fact that Nova Scotia has attained such magnitude as a steel producer is regarded as encouraging by the Canadian trade.

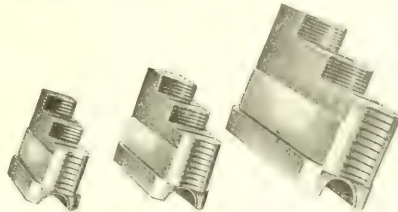
It is expected that excavations will be begun and foundations laid in Queen's Park, Toronto, early next spring for the new Trinity College. The latest estimates place the cost of the first stage of construction at half a million dollars.

The Machinery & Foundries, Limited, Brockville, which was recently incorporated to manufacture hand and power pumps, and gray iron and brass castings, will be in operation early this month.



DOMINION CHUCKS

STEEL OR CAST-IRON BODY
BUILT FOR HEAVY DUTY



The Jaws Are Extra Strong

THEY are drop forgings, made of best quality steel, heat-treated and hardened. The threaded portion of jaws form a half nut for the setting-up screws. Have stood the test of heavy duty work in our own shops where accuracy was the only accepted standard.

DOMINION STEEL PRODUCTS CO.
LIMITED

Engineers • Manufacturers

BRANTFORD, CANADA



PATENTS ATTORNEYS

PATENTS
Fetherstonhaugh & Co.,
The old established firm. Patents everywhere. Head office: Royal Bank Bldg., Toronto. Ottawa office: 5 Elgin St. Offices throughout Canada. Booklet Free.

PATENTS PROMPTLY SECURED

In all countries. Ask for our Investor's Advisers which will be sent free.

MARION & MARION 364 University St.
Merchants Bank Building, corner
St. Catherine St., Montreal. Phone Up. 647.
and Washington, D.C., U.S.A.

HIGH **Machin** CLASS
Tools
FOR SHIPYARDS AND
CONSTRUCTIONAL WORKS
BERTRAMS LIMITED
SCIENNES EDINBURGH

HAMILTON ENGINEERING SERVICE LIMITED

Consulting and Designing
Tanks, Jags, Boilers and
Special Machinery. Let
us shoulder your problems.

17 MAIN ST. EAST, HAMILTON

OVENS
Brantford Oven & Rack Co. Ltd.
Brantford, Canada

DROP FORGE DIES

Send us your requirements and we will
furnish you prompt quotations. We
manufacture and supply all sizes of
your dies made in Canada. First-class
work, prompt service.

THE KIMBER & MILLER MFG. CO.
Thorold Road, St. Catharines, Ont.

SALESMEN WANTED

Must be thoroughly familiar
with the Foundry and Coal Mining
Trade. Box 719 F, Canadian Ma-
chinery.

MACHINE WORK WANTED

AGENCIES WANTED

...the ...

POSITIONS WANTED

[illegible]

HELP WANTED

It is the author's intention to publish the results of the present study in a paper in the near future. The author is grateful to the American Cancer Society for the grant that supported this work.

FOR SALE

Contracted paper and cardboard. Approximately 1000000 lb. of paper and cardboard are imported and exported annually. The leading plants in Canada are International Paper Co., Ltd. (1950) and the following plants are being constructed: Pulp and Paper Mills, Ltd., 1950; Can. Paper International, Ltd., 1950; and H. W. Pettie, Limited, Toronto.

What can we do for YOU?

Through these columns thousands of dollars of equipment are disposed of each year. If you are not using Canadian Machinery now, let us tell you what others have done—are doing.

CANADIAN MACHINERY
Classified Advertising Section
143 University Ave., Toronto

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS
Street, Toronto. Patterns in wood and metal
for all kinds of machinery. (ctfm)

BRANTFORD PATTERN WORKS ARE PRE-
pared to make up patterns of any kind, in-
cluding marine works—to sketches, blue prints or
sample castings. Prompt, efficient service. Bell
Phone 611, M. C. 111 to 700. Brantford Pat-
tern Works, 49 George St., Brantford, Ont. (ctfm)

PATTERNS

Wragge's Pattern Works, 10 George St. South, Galt, Ont., Phone 1105 W. Equipped for all services in wood or metal patterns for all construction. Most reasonable prices. Expert workmanship. "Nothing ragged but the name." (cxxxvi3m)

Modern Marine Machinery

Automatic Steam Towing Machines, Ship
Windlasses, Cargo and Deck Winches,
Steam Capstans, Dock Gypsies, Steering
Engines, Hydraulic Freight Hoists, etc.
Grey Iron and Brass Castings. Special
machinery built to order. The Corbet Foundry & Machine Co., Limited, Owen Sound,
Ont. (52)

MACHINE WORK WANTED

When we apply the same to all forms of population control, we get the same result. All reproductive efforts will tend to be concentrated on the most fertile, susceptible and healthy individuals, and to the detriment of all others.

PERFECT MACHINE COMPANY. GALT

Builders of Reliable Machinery.

Grey Iron Castings

Fast and Modern Bench and Floor Repetition
Castings Capacity 15 tons per day
Expert Metal and Wood Pattern Work. Our
experienced estimators will save you money.
Semi-automatic operations on lathe or grill on
castings supplied if required.
ASK US.

REGO WELDING *and* CUTTING APPARATUS

Oxygen, Acetylene, and a complete line of Welding and Cutting Supplies.

Carter Welding Co.
of Toronto, Limited
7-11 Sheppard St., Toronto, Ont.
Phones: Adelaide 2841 and 1524 (TF)

MACHINERY WANTED

WANTED—NEW AND RE-MANUFACTURED
gas and gasoline engines, boilers, saw-mill machinery, planing mill and sash and door factory machinery. New and manufactured iron and wood-working machinery. Electric motors, dynamos, direct connected steam operated generators, portable electric tools. Builders' hoists, elevators. Box 728-F, Canadian Machinery.

IF YOU HAVE IRON-WORKING OR WOOD-
working machines for sale, or idle machine
shop equipment, call or write Canada's largest
dealers in new and used machinery. **H. W.**
Petrie Limited, Toronto, Ont. (cfm)

WANTED — WOODWORKING MACHINERY
and mining machinery, machine tools, boilers
and steam pumps, alternating or direct current
motors. Contractors' equipment. Apply Box 737F,
Canadian Machinery.

ONE SINGLE STAND 9 x 18 ROLL IN GOOD condition; one receiving separator, capacity about 1,000 bushels per hour. Crane Bros., 817 Ferry St., Niagara Falls, Ont.

FOR SALE

- 2—ROTARY STEAM DRIERS— 6' DIAM. x 23'
long; complete.
2—ENDLESS DOUBLE LEATHER BELTS, 18"
x 40 total length each.
1—8" x 12" DOUBLE DRUM BEATTY HOIST
and boiler.
1—6" x 12" DOUBLE DRUM BEATTY HOIST
and boiler.
2 AIR COMPRESSORS, 800 FT. CAPACITY;
belted

Box 752F, Canadian Machinery.

FOR SALE

Perfected rotary engine valve, simple design, free from defects common in rotary valves. Patented Feb. 20, 1917. Can be inspected at and purchased from H. W. Petrie Limited, Toronto.

MACHINERY FOR SALE

- 2-24" x 12' Canadian Machinery Lathes
- 2-22" x 10' Davies Lathes.
- 1-21" x 10' London Lathes.
- 6-20" x 8' C.M.C. Lathes.
- 1-18" x 8' Mueller Lathes.
- 3-19" x 8' C.M.C. Lathes.
- 1-18" x 8' London Lathes.
- 8-18" x 8' C.M.C. Lathes.
- 1-16" x 6' McDougall Lathes.
- 1-D. H. D. Colburn Drill.
- 2-No. 24 H. D. Foote-Burt Drills.
- 1-28" B. G. Barnes Drill.
- 1-22" B. G. Barnes Drill.
- 1-D.C. Compound Wood Generator,
- 2-No. 40 Valves, 120 H.P.
- 2-No. 54 Yalms Spruce Cutters.
- 2-26" x 26" Pratt & Whitney Turrets.
- 1-10" x 52" Plain Landis Grinder.

Write us for particulars and prices.

Box 751 F.
Canadian Machinery

PARTIAL LIST OF MACHINE TOOLS FOR IMMEDIATE DELIVERY



LATHES

Alfred Herbert Hexagon Turret Lathes for bar work for 1 1/2" and 2 1/2" dia. bar.
Alfred Herbert Combination Turret Lathes, 13", 20", 22" swing.
Springfield 16", 18", 20" cone pulley and geared head Engine Lathes.
48" x 24" bed Tangye Geared Head Lathe.

DRILLING MACHINES

12" Pollard Bench Drills.
1, 2, 3 and 4-spindle Herbert Ball Bearing Drills.
20", 22", 24", 27" Pollard Upright Drills.
36" Pollard Sensitive Radial Drill.
6" Tangye Radial Drill.

SHAPERS

16" Milwaukee.

PLANERS

24" x 24" x 6" Stirk Planing Machine.
60" x 60" x 16" Stirk Planing Machine.
36" x 36" x 8" Stirk Planing Machine.

MILLING MACHINES

No. 3 Herbert Horizontal Cone Pulley, 21" x 7" x 16".
No. 16 Herbert Horizontal Single Pulley, 34" x 13 1/2" x 20".
No. 1 Herbert Vertical Cone Pulley, 30" x 12 1/2" x 20".
No. 16 Herbert Vertical Single Pulley, 34" x 13 1/2" x 21".
No. 8 Herbert Vertical Cone Pulley, 62" x 38" x 28 1/2".

We solicit your enquiries for Machine Shop Equipment

ALFRED HERBERT, LIMITED

1-3 JARVIS ST.

TORONTO

It Might Be Here!

GRINDERS

- 7—No. 6 Perfects.
- 1—Stevens Cutter Grinder.
- 1 Brown & Sharpe Surface Grinder with magnetic chuck.
- 1—No. 2 Wilmarth & Norman surface grinder.

LATHES

- 3—28" x 12" Boye & Emmes, 3 step cone, D.B.G., Q.C.G.
- 1 24" x 12" Boye & Emmes, 3 step cone, D.B.G., Q.C.G.
- 1 24" x 10" Boye & Emmes, 3 step cone, D.B.G., Q.C.G.
- 1 24" x 12" Rahn Larmon, 3 step cone, S.B.G., S.Q.C.
- 1 22" x 10" Devenport, 3 step cone, D.B.G., Q.C.G.
- 1 22" x 10" Reed, 3 step cone, S.B.G., S.Q.C.
- 1—22" x 10" Milwaukee, 3 step cone, D.B.G., S.Q.C.
- 1—21" x 10" Sidney, 3 step cone, D.B.G., Q.C.G.
- 1 21" x 10" LeBlond, 3 step cone, D.B.G., Q.C.G.
- 1 20" x 8" American, all geared head.
- 1—20" x 8" American, 3 step cone, D.B.G., Q.C.G.
- 1—19" x 8" LeBlond, 3 step cone, D.B.G., Q.C.G.
- 1 18" x 8" Walcott, 3 step cone, D.B.G., Q.C.G.
- 1 18" x 8" Greaves Klausman, 3 step cone, D.B.G., Q.C.G.
- 1 18" x 8" Mueller, 3 step cone, D.B.G., Q.C.G.

SPECIAL OFFER IN SHAPER

6 14" Davies Shapers (New), bargain to quick buyers.

The purchasing agent who does not ask for quotations from this office is not aware of how far prices can be cut to meet his requirements.

My policy is to **SELL** machines not to **STORE** them.

Western representative, Geo. F. Fox, Macdonald & Simpson Co., Ltd., Montreal.

R. S. HOLLY

Suite 502, Kent Building
Toronto, Ont.

Phone: Adelaide 3147

GARLOCK-WALKER LIST

If You Want Machine Equipment, Send Us Your Enquiries

We have one of the largest stocks of new and used metal and woodworking machines in Canada.

Many machines only very slightly used and all absolutely guaranteed.

A few machines from our Toronto stock at exceptionally attractive prices are:

LATHES

- 1—6" x 4" "Barthol" (used).
- 1—8" x 11" "Newcomb-Pond" (used).
- 1—8" x 11" "Newcomb-Pond" (used).
- 1—8" x 10" Milwaukee (new).
- 1—8" x 8" "Rae" (new).
- 1—8" x 6" "Rae" (used).
- 1—12" x 8" "LeBlond" Tool Room (used).
- 1—8" "Rivett" Cabinet Type, full attachments (used).
- 1—8" "Cataract" Precision (new).

GAP LATHES

- 1—8" x 14" x 12" Bertram (used).
- 1—8" x 10" x 16" McDougall (used).
- 1—8" x 10" x 7" South Bend (used).
- 1—8" x 8" x 12" C.M.C. (used).

TURRET LATHES

No. 1 Millholands, capacity 1 1/2" (used).
Several Oliver & Davis Turrets, various capacities (used).

SHAPERS

- 1—6" "MacKenzie" B.G. Crank Shaper, (new).
- 1—16" "Rae" B.G. Crank Shaper (slightly used).
- 1—24" "McGregor-Gurley" B.G. Crank Shaper (used).

PLANERS

- 1—42" x 42" x 20" Putnam, 1 head (used).

- 1—30" x 30" x 10" Pond, 1 head (used).
- 1—24" x 24" x 6" Powell, 1 head (new).

MILLING MACHINES

- 1 Briggs High Duty Type "A" 22" Traverse (new).
- 1 Briggs High Duty Type "B" 42" Traverse (new).
- 1—Whitney Hand Miller, 18" x 6" table (used).

DRILLS

- 2—10" Burke Sensitive (Bench type) (new).
- 1 15" Barnes (used).
- 20" "Stibley," "Champions," "Rockwell" and "Silver" (new) and (used).
- 1—36" C.M.C. Heavy Duty (used).
- 1—3-spindle 20" Silver Gang Drill (used).
- 1 4-spindle W. & R. Sensitive (used).

BORING MACHINES

- 1—60" Bement-Niles Vertical, 2 heads, 24" under rail (used).
- 1 Universal No. 2 1/2 Horizontal Table, 42" (used).
- 1 Bullard "New Era" Vertical Turret, 36", complete equipment (new).

POWER HACK SAWS

- 1 No. 10 Rapco, 87" x 8" (new).
- 1 No. 7 Watkins 4" Cap, 18" Blade (used).
- 1 6" x 6" Raeme (used).

AIR COMPRESSORS

- 1 12" x 12" Bury, Class "1" 100 gallon (used).
- 1—8" x 8" Sullivan, Class W.G.-3, Belt driven (used).
- 1—8" x 10" x 8" Bury, Steam driven (used).
- 1—8" x 12" x 14" American Steam Pump Co., motor driven (used).

MISCELLANEOUS

- 1 Brown-Beggs No. 200, Power Press (new).
- 1 Lennox Rotary Bevel Shaper, 1" Cap. (new).
- 1 "Hud. Speed" Hammer, No. 1A (used).
- 1 Bandura Champion Power Hammer, No. 20 (used).
- 1—"Grant" Riveting Machine, No. 80A (used).
- 1 "Grant" Riveting Machine, No. 80B (new).
- 1 Allen Press, No. 1 "Greenwood" (new).

GRINDING MACHINES

- 1 Landis No. 1 Universal (used).
- 1 Landis Plain, self-contained, 36" x 12" (used).
- 1 Norton Plan No. 100 (used).
- 1 Frothingham Cylindrical, 14" x 96" (used).
- 1 Saxton Tool and Cutter Grinder, 14" x 96" and (used).
- 1 "Globe," "Stevens," "LeBlond" and "Cincinnati" (used).

GARLOCK-WALKER MACHINERY CO., LIMITED

MONTREAL, 337 St. James St.

TORONTO, 32 Front St. W.

WINNIPEG, 567 Banning Ave.

Warehouse: 163 Dufferin Street, Toronto

"A voice roared out, hoarse, profane;--the Mate's voice: 'Thought you'd try it again, did you, you dashed beach-comber. I'll teach you, and when I find the dog that left that rope for you I'll give him a leaf out of the same book. You bloody waster! I'll teach you! I'll !' "

This is an extract from Frank Packard's "Pawned," which commences in the February 15th issue of MACLEAN'S MAGAZINE.

At the period in the story that this is written the leading character is a

beach-comber in the South Sea Islands.

Three months later, John Bruce is stretched at full length on a luxurious divan in the most sumptuous apartment of the Bayne-Miloy, New York's newest and most pretentious hostelry.

How had this wonderful metamorphosis been made? It is a mystifying, enthralling, intriguing story, the secret of which you can only get by reading every instalment of Frank Packard's wonderful yarn.

OTHER UNUSUAL FEATURES

"Are We Ashamed of Our Snow? No!"

By Charles Christopher Jenkins.

This tells the story of the conquering of the snow-drift problems by the railways of Canada.

"The Drama of Our Great Forests".

By Arthur Henning.

"Meeting of the Wild Men," filled to the brim and overflowing with forest-lore.

"Solons of the 80's"

By Col. Geo. H. Ham.

Some episodes of the 80's and 90's when he and his confreres were recording Canada's political history.

"Soldiers' Settlements Making Good"

By Agnes C. Lunt.

The wonderful success which has met the work of the Soldiers' Settlement Board in the West.

"The Cross in the Sky"

By R. T. M. Scott.

A psychic story; simply, forcefully told, and tinged with war atmosphere.

"The Queer Toff in Number 13"

By Leslie Gordon Bazanad.

A human story of a brilliant man who almost "pegged out" until a wonderful love drew him back.

"The City of Peril"

By Arthur Stringer.

The concluding instalment of this melodramatic serial by one of Canada's favorite authors.

REVIEW OF REVIEWS

A selection from all the most interesting and instructive periodicals garnered from all quarters of the globe—autobiographical, scientific, descriptive and literary. The best from more than 100 magazines and newspapers—to save your time.

MACLEAN'S

"CANADA'S NATIONAL MAGAZINE"

FEBRUARY 15th ISSUE

For Sale on
All News-stands

20c

HANNA

IRON ORE - PIG IRON

Sales Agents:

Cleveland


Cincinnati

Pittsburgh

Toronto

Buffalo

Detroit



**Increased Output
and
Lower Operating
Costs**

follow the use of
**P.H. and IMPERIAL
FILES.**

*"They Cut Faster and
Wear Longer."*

Be File-Wise.

**INGERSOLL FILE COMPANY,
LIMITED.**

John Morrow Screw and Nut Company
Limited,
Sole Distributors,
Ingersoll, Ontario.

INGERSOLL



NOVO-SUPERIOR

**HIGH SPEED STEEL
INTRA STEEL GIBRALTAR STEEL
Tool Steel for Every Purpose
Swedish Lancashire Iron**

Twist Drills, Taps, Hack Saw Blades Milling Cutters,
Files, Etc., Music Wire for Springs, Steel Balls.
Cold Rolled Tool Steel in Strips and Sheets,
Circular Saws, Machine Knives.

**PILOT STEEL & TOOL COMPANY,
LIMITED**

332 St. James Street, Montreal

Sole Agents for
JONAS & COLVER, LIMITED **H. BOKER & CO., Inc.**
Novo and Continental Steel Works. New York, N.Y.
Sheffield, Eng.

**VICTORIA Special Machinery
DESIGNS PATTERNS
CASTINGS FORGINGS**

Send for Catalogue

Victoria Foundry Co., Limited, Ottawa, Canada

Monel Metal Castings
For Anti-Corrosive and Superheat Service
Made in Canada by

CANADIAN DRIVER-HARRIS CO.

WITH AN OFFICE AND SHOP
CHICAGO
20 So. Jefferson St.

WALKERVILLE, ONT.
CANADA
BATHURST, QUE. AND WINDY
HARRISON N.J.

BRITISH WORLD
BANKMASTER
ENGLAND

SHAFTING

Cold Drawn, Turned and Polished Steel,
Rounds, Squares, Hexagons and Flats,
Steel Piston Rods, Pump Rods.

Special facilities for Keyseating up to 6 in. diameter.

**THE
Canadian Drawn Steel Co.**

HAMILTON LIMITED CANADA

Good Times Just Ahead

PROSPERITY is within our reach in Canada.

All we need to have and to hold it is a sane, sure grasp on its simple elements.

They are Industry, Integrity, and Faith.

These are the cardinal virtues of human relations. They are the underpinnings of healthy, natural business life and the foundation of a wholesome social system.

They are the fountainhead from which Progress springs. A well-known business economist has called them the "Fundamentals of Prosperity."

Your purchases are an expression of Faith. They are evidence of your Industry. Make them confidently from business institutions of Integrity.

Buying is the backbone of prosperity. An active market means more employment, steadier earnings; benefits are passed around.

Wise spending gives stability to earning and for that reason is far-sighted thrift and sound economy.

The call of to-day is for cheerful thinking, willing working and constructive action by you—everybody—NOW.

To-morrow's change for the better will come about through the combined efforts of each and every one of us.

By sheer force of numbers and co-operation, by the high power of heart and mind, we can put Business on a firm, stable basis.

We can do this because all of the material factors making for better business are right.

Let us link our faith with industry, our vision with courage, and forge ahead.

Let's make an uncommon effort toward a common end—Good Times.

*A message from the
Associated Advertising Clubs
of the World.*



STRENGTH

Strength is a very essential quality in a wrench, but it does not depend entirely upon bulk or weight of metal. The strength and long-lasting qualities of Armstrong Wrenches are the result of skilled combination of the Best Steel, Expert Design, Accurate Machining, and Heat Treatment. All kinds and sizes.

Write for free Catalogue

Armstrong Bros. Tool Co.

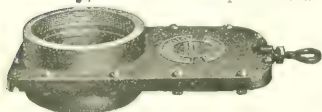
"The Tool Holder People"

335 N. Francisco Ave., Chicago, U.S.A.



New Air-Tight Blast Gates

will help you maintain the safety, economy and efficiency so essential in the operation of furnaces and other appliances using low or moderate pressure air.



THEY ARE SAFE—because they are ruggedly built of only a few simple parts; the blade stays fixed in any position and by a slight pull of the handle is easily adjusted to give the blast desired.

THEY ARE ECONOMICAL—because the initial cost is small; the simple construction eliminates wear and tear.

THEY ARE EFFICIENT—because careful machining makes them **AIR-TIGHT**; they afford the full area of the blast pipe, in striking contrast to a stop cock; they are quick in operation; they can be placed in any position.

In short, these New Air-Tight Blast Gates possess all the advantages of stop cocks and valves, and have special features that tend for greater usefulness and economy.

SIZES 2" TO 16"

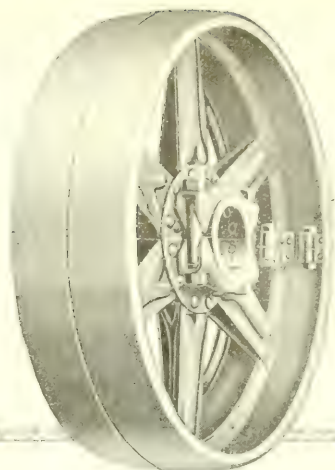
Write for Bulletin 210-T

W. S. ROCKWELL COMPANY

Furnace Engineers and Contractors

50 Church St., New York

Canadian Distributors:
Drummond, McCall & Co., Limited, Montreal



The Largest Plant Devoted Exclusively to Making Steel Pulleys

THIS position, held by the American Pulley Company, could not have been reached had it not determined the correct principles of pulley construction.

For 25 years the features of various types of pulleys have been studied, compared and tested. No detail has been too small to investigate, and it is significant that, though there has been refinement, the basic principles remain the same.

But even such painstaking attention to construction would not have brought the "American" Pulley to its present position had not equal effort been placed on conscientious business management and fair dealing.

"Getting Maximum Pulley Efficiency" describes "American" Pulley features in detail. Write for your copy.

The American Pulley Company
Philadelphia, Pa.



tools for Your Plant

Thor



PORTABLE ELECTRIC DRILLS

Drills unequalled for power at their weight; motor, hand wound, triply insulated, all encased in light aluminum. The result is drilling power when needed, right from the nearest electric light socket. Many plants using air tools have a number of sturdy electricies to handle the special jobs away from the air line. Others have standardized in speeding up production with THOR electricies.

THOR Electric Tools include 8 sizes of Portable Drills, with drilling capacity in steel, ranging from $\frac{1}{4}$ " to 2"; and a Portable Grinder with 4" wheel. Get three or four THORS for demonstration on your work. Until you are convinced of THOR quality, you are not obligated.

The THOR line also includes a complete list of Portable Pneumatic Tools.

Full details upon request.

INDEPENDENT PNEUMATIC TOOL CO.

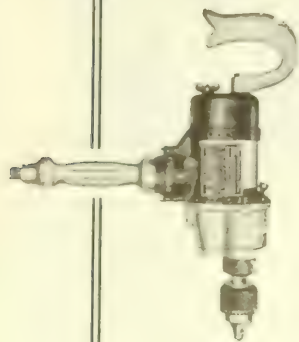
600 W. Jackson Blvd. Chicago

334 St. James St., Montreal.

32 Front St. West, Toronto.

123 Bannatyne Ave. E., Winnipeg.

1142 Homer Street, Vancouver.



DIAMOND TOOLS

FOR TRUING GRINDING WHEELS



Tools For All Mechanical Purposes

FURNISS CLARKE & COMPANY

364 University St.

MONTREAL

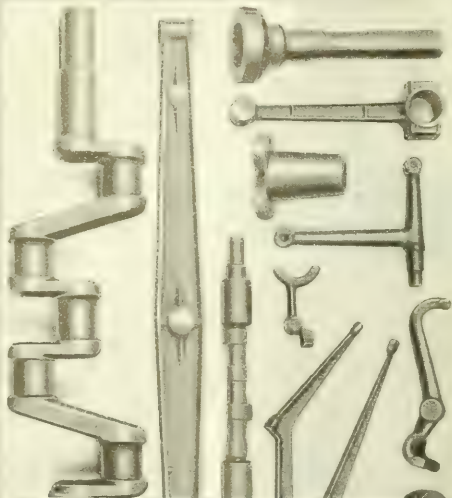
Sole Canadian Agents for

THE JOYCE-KOEBEL COMPANY, INC.

Formerly Geo. A. Joyce Co., Ltd.

NEW YORK

LONDON



DROF FORGINGS

One of the Largest
and Best Equipped
Plants anywhere.



Consult us
as to your
requirements.

Dominion Forge & Stamping Co., Limited

Walkerville, Ontario

Toronto Office

Excellent Life Building



Like Mahomet and the Mountain

It was lots easier to bring Prest-O-Lite and the oxy-acetylene flame to this mammoth wheel than to haul the wheel five miles from a mountain mine to a repair shop.

That's one of the advantages of Prest-O-Lite. Its ready portability makes oxy-acetylene welding possible

and remarkably economical anywhere and everywhere.

And a chain of plants and warehouses assure a constant supply of Prest-O-Lite, the Universal Gas with the Universal Service.

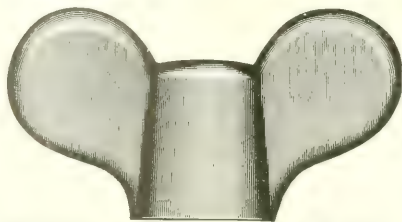
All of which means a Nation-Wide Service which you will be interested in knowing all about.

PREST-O-LITE COMPANY OF CANADA, LIMITED HILLCREST PARK, TORONTO

Branches at: Montreal, Toronto, Winnipeg. Plants at: Toronto, Ont.; St. Boniface, Man.;
Merritton, Ont.; Shawinigan Falls, P.Q.

CANADA FOUNDRIES & FORGINGS LIMITED

DROP FORGED STEEL



WING
NUTS

EYE
NUTS

All Sizes

Canadian Billings & Spencer Plant
Welland

DUNBAR SPRINGS

ACCURACY ASSURED

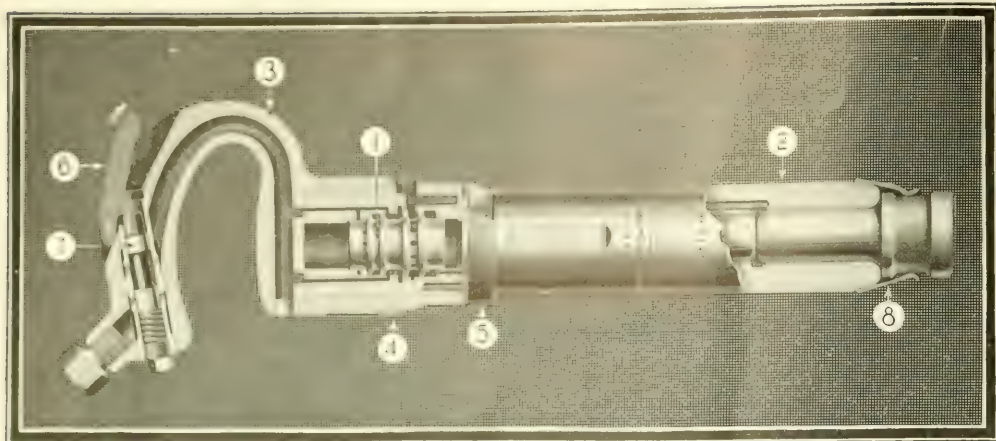
You can always depend upon Dunbar Springs being accurate. Before proceeding with any order the first few springs are carefully tested and checked up for this very purpose.

Seventy-two years' experience making flat and spiral springs of every description enables us to furnish you with springs of the highest quality, that can be depended upon under all conditions.

Send blue prints for estimates.

The Dunbar Brothers Co.
BRISTOL, CONN.





Boyers cost least *per rivet driven!*

THE cost *per rivet driven* is the true gauge of riveting hammer efficiency. No riveting hammer built has ever equalled the performance of the Boyer measured on the basis of *work done per hammer*.

Here are eight reasons why:

- 1 The Boyer patented hollow cylindrical valve, made of highest-grade steel, accurately hardened and ground to insure long life, air economy and freedom from breakage. Piston in action passes through the valve and is cushioned on its return stroke. Result—rapid, hard-hitting blows due to long-stroke and large air ports; shortened over-all length, minimized vibration and strain on operator. Boyer valves—the valve with five lives—are made in four over-sizes, resulting in constant air economy, sustained driving power, uncommon durability and low upkeep expense.
- 2 Special steel cylinder which, in production, passes through *sixty-five* distinct operations and processes, each performed by most modern equipment, with exacting care to provide proper machining, heat treating and finishing. Result—long wear without waste of air.
- 3 Boyer patented handle accurately formed to fit-the-grip, from high-grade specially heat-treated steel, insuring unusual strength. Handle, when gripped, places operator's arm in direct alignment with all reciprocating parts. Result—a riveting hammer that works *with* the operator, constantly encouraging more and better work.
- 4 Patented locking ring surrounding cylinder. Makes possible the unique method of assembly characteristic of the Boyer—and one reason why the three unit parts of the Boyer can be so rapidly disassembled for cleaning and inspection.
- 5 Patented exhaust deflector, instantly adjustable to any radial position. Protects operator's clothing, boosts his morale and keeps him "fit" for continuous efficiency.
- 6 Trigger control conforming to operator's natural grip. Embodies but two major parts, works smoothly and with a minimum of manual effort.
- 7 Valve stem heat treated to resist wear. Operates in replaceable steel bushing.
- 8 Boyer patented spring-clip set-retainer holds the set in place in the cylinder without restricting the free longitudinal movement of the set when in operation.

There is only *one* Boyer. Prompt delivery from Branch stocks. Ask for Bulletin 600.

Sales Representatives

The Holden Company, Limited

354-356 St. James Street, Montreal, Canada

Branches: TORONTO, 44 Adelaide Street, West WINNIPEG, 120 Princess Street VANCOUVER, 51 Pender Street
Canadian Factory: Canadian Pneumatic Tool Company, Montreal

BOYER PNEUMATIC HAMMERS • LITTLE GIANT PNEUMATIC AND ELECTRIC TOOLS
CHICAGO PNEUMATIC AIR COMPRESSORS • VACUUM PUMPS • PNEUMATIC HOISTS
GIANT OIL AND GAS ENGINES • ROCK DRILLS • COAL DRILLS

BOYER

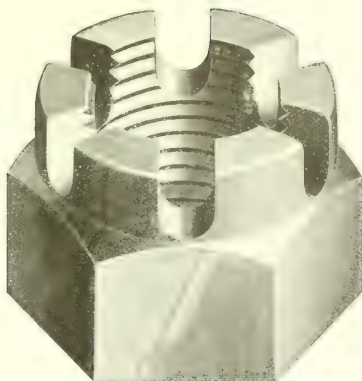
The world's standard



HAMMERS

wherever rivets are driven

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.



STANDARD

S.A.E. Plain & Castellated Nuts
V., U.S.S. & S.A.E. Cap Screws

V., & U.S.S. Semi-finished Nuts
V., & U.S.S. Set Screws

SPECIAL

Screw machine product up to 2 $\frac{1}{4}$ diam., to specifications. Hardened and ground product to specifications.

THE NATIONAL ACME COMPANY
MONTREAL, P.Q.

De Courcelles

G. T. R. R.

The "SELSON" Shaping Machines

*High Speed
and
Heavy Cut*

Sizes

10, 13, 17, 25 and 30"

Rigidity, durability and ease of
manipulation are combined
in the design.

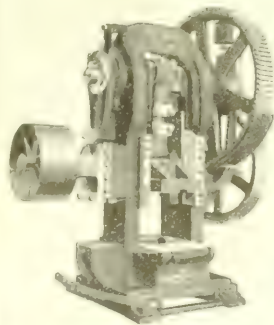
SELSON
ENG. CO., LTD.

SELSON HOUSE, 83 and 85 QUEEN VICTORIA STREET
LONDON, E.C.4, ENGLAND.

WORKS: COVENTRY

Branches: Paris, Brussels, Turin, Milan, Melbourne, New York

The "TOLEDO" STRAIGHT SIDED PRESSES



Notable for design and construction on heavy work, low upkeep cost, efficient and accurate performance.

With outer trimming slide they are especially adapted to work in shops for engineering plants for trimming drop forgings hot or cold, 70 sizes, weighing from 3,000 to 150,000 lbs.

Warranted especially for diagnosing and prescribing for individual press and die needs.

THE TOLEDO MACHINE & TOOL CO.
TOLEDO, OHIO.

Steel Fingers Slip into The Flutes

Grip the broken tap and back it out before you've had time to count three times sixty.

The Walton Tap Extractor



removes broken taps buried below the surface of the work without trouble or loss of time. It removes any broken tap without injuring the thread. It saves the casting or forging. Pays for itself over and over—often on the very first job.

How many do you want on trial?

The Walton Co.

Hartford

Conn.

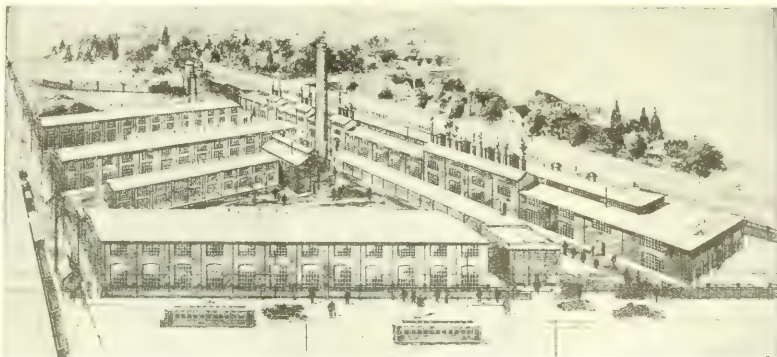


Hull Iron and Steel Foundries, Limited *Hull, Quebec*

Steel, Chrome, Manganese and Nickel Steel Castings

Annealed and Unannealed

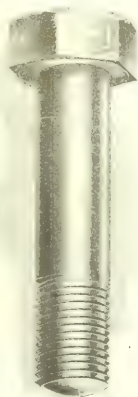
Cement Mill and Mining Machinery Castings, Stamp Mills, Crushing Plants, Excavating Outfits, Steel Car Wheels, Locomotive Driving Wheels and Frames, etc.



Machine-Moulded Gears

"HISCO" machine-moulded gears, while requiring no pattern, insure accuracy, dependability, quality, and the price is minus the cost of patterns—which in these days of high prices of lumber is something to be considered.

Specify "HISCO" Products



ACCURACY

Just now all jobbers should have a complete stock of SAE Cap Screws, Plain and Castellated Nuts and Taper Pins to meet the automobile repair trade requirements.

Your rush orders filled promptly by



**The Galt Machine
Screw Co., Limited**

GALT, ONTARIO

Eastern Representatives:

Messrs. F. BACON & COMPANY
131 St. Paul Street West, Montreal, Que.

Western Representative:

Mr. D. PHILIP

138 Portage Avenue, Winnipeg, Man.



In the heart of the metal working centres you will find

SKINNER CHUCKS



accurately and steadily holding the most difficult jobs day in and day out. They are sturdy and dependable, easy to operate, and give universal satisfaction.

Have you a Skinner Catalogue?

THE SKINNER CHUCK COMPANY

NEW BRITAIN, CONN U S A

ESTABLISHED 1887

NEW YORK OFFICE
41 READE ST

SAN FRANCISCO OFFICE:
RIALTO BLDG

LONDON OFFICE:

139 QUEEN VICTORIA ST., LONDON, E.C.4.

ROCKFORD

—the best for varied work

General manufacturing plants prefer the Rockford Miller because they require a machine which they can depend on to do any work within its range to the complete satisfaction of the inspection department.

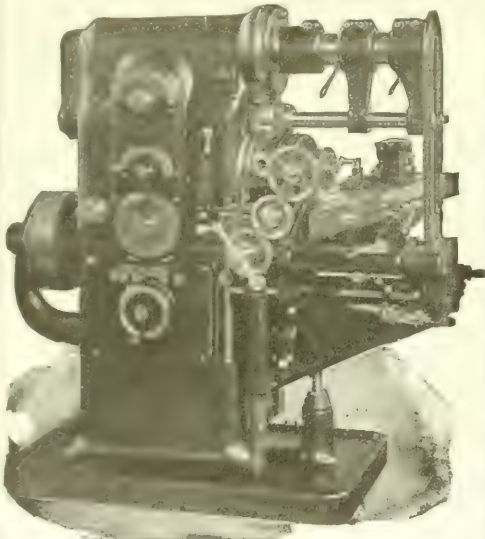
Simplicity of operation and absolute rigidity under every condition are distinctively Rockford features. They have made this the very best machine for general manufacturing.

Full details on request

Rockford Milling Machine Co.
Rockford, Illinois

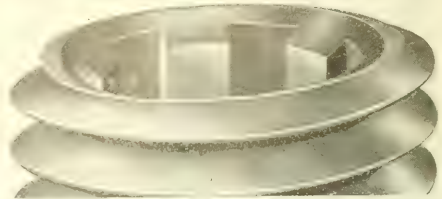
Agents:
Rudel-Belnap Machinery Co.
Toronto

A. A. Jones & Shipman, Ltd., Leicester, England, Great Britain; Louis Besse, Paris, France and Belgium; Societa Anonima Adler & Co., Milano, Italy, Italy and Colonies; Rylander & Asplund, Stockholm, Sweden, Scandinavia; Casamitjana Hermanos, Barcelona, Spain, Spain and Portugal; Selson Engineering Co., Melbourne, Australia; M. Mett Engineering Co., Petrograd, Russia.



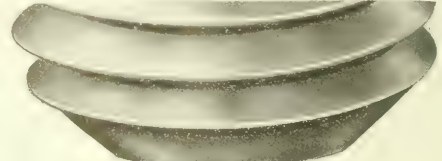
TRADE MARK
BRISTO

PATENTED SAFETY SET SCREWS



SET A NEW STANDARD

The distinctive dove-tail slots or flutes of the "Bristo" safety set screw are one of the features which put "Bristo" in a class by itself. "Mushrooming," for instance, is impossible, and splitting or cracking have been removed from the list of your manufacturing worries. As the wrench turns, the unique "Bristo" design contracts the screw; on releasing the pressure the screw tends to expand—a tremendous gripping factor.



Get copy of new Bulletin I-810.

THE BRISTOL COMPANY
Waterbury, Conn., U. S. A.

The Diamo-Carbo Dresser



This Dresser consists of a steel tube filled with an abrasive of such intense hardness that it will cut and dress any grinding wheel except the "hard" grade or the extremely coarse and large wheels used for grinding castings. The abrasive wears away slowly and, on the usual run of tool grinding wheels, lasts indefinitely. The Diamo-Carbo is now accepted as a satisfactory and economical substitute for the expensive black diamond and has been in use in the foremost shops in the world for the past ten years.

Write for catalog of our various types of dressers.

**The Canadian Desmond-Stephan
Mfg. Company, Limited**

HAMILTON - ONTARIO

ELK BRANDS FIRE BRICK

*You Are Entitled to the Best
for Your Money*

That's one of the policies of our business. That's the factor that instigated us to produce several brands, making a great variety of mixtures and burns so that no matter what the demands of our customers we can promptly supply them with the proper brand at the right price.

Large stock of various shapes carried in our warehouse at Hamilton.

"Elkeo," "Elkeo Special," "Elk Steel,"
"St. Marys," "Keystone," "M. D.
Elk," "Rotex," "Elk Dust," "Key-
stone Dust," "Rotex Dust."

**Elk Fire Brick Company
of Canada, Limited**

Sun Life Building - Hamilton, Ontario

ON THE LISTS OF ADMIRALTY, WAR OFFICE,
CROWN AGENTS FOR COLONIES, ETC.

Manufacturers
of

EXTRUDED
BRASS
and
BRONZE
RODS
and
SECTIONS.

HOT
BRASS
and
BRONZE
STAMPINGS
and
PRESSINGS.

GUN
METAL,
PHOSPHOR
BRONZE,
BRASS
and
WHITE
METAL
INGOTS.

CHILL
CAST
PHOSPHOR
BRONZE
BARS.

PHOSPHOR
COPPER
and
PHOSPHOR
TIN.

McKechnie Brothers, Ltd.

COPPER SMELTERS

**BRASS ROD, STAMPINGS AND METAL
MANUFACTURERS**

**ROTTON PARK STREET
BIRMINGHAM, ENGLAND**

We stock in Montreal Free Turning Brass and Bronze Rods, suitable for high speed Turning both in Round and Hexagon.

We shall also be pleased to quote for shipments direct from Birmingham, shipping in two weeks' time.

Sole Canadian Agents:

Thomas Moore & Son

224 Lemoine Street, Montreal

We excel in quantity production

Examine the Grain!

A properly alloyed babbitt has a perfectly uniform grain.

Break a bar of the babbitt you are using

If you find the grain irregular—if it shows a mixture of fine and coarse particles—if it shows a separation of layers—one dark and one light in color—

then you may know that it is poorly alloyed—and that you can get far better wear from

Lionroyal

produced by the **STANLEY PROCESS**
of alloying.

Lionroyal is clean—uniform—dense grained—and durable.

It is copper-hardened and tin-toughened. Bearings lined with it carry the load evenly—every inch of bearing surface equally durable.

It has no hard spots of copper or antimony, because the hard elements are thoroughly and uniformly amalgamated with the tough elements. This fact bespeaks steady service and long wear.

*Write for booklet "AB" to
know more about pouring
and using Babbitt.*

**BRITISH
SMELTING & REFINING
COMPANY LIMITED**

MONTREAL

HINTS TO BUYERS



NORTHERN CRANES

"MADE IN CANADA"

Electric Travelling Cranes, Hand Cranes, Electric Hoists, Air Hoists, Foundry Equipment, Cupolas, Ladles, etc., etc.



"Type D" Electric Hoist

NORTHERN CRANE WORKS LIMITED
WALKERVILLE, ONTARIO

CRANE FITTINGS

CRANE LIMITED

HEAD OFFICE & WORKS
1280 ST PATRICK ST

MONTREAL

Branches: Toronto, Winnipeg, Vancouver.
Sales Offices: Halifax, Quebec, Ottawa, Calgary.



T
R
Y

T
H
E

S
T
E
I
N
L
E

LET US TELL YOU ABOUT THIS MACHINE

Send Us Prints of Your Work

STEINLE TURRET MACHINE CO.
MADISON, WIS., U.S.A.

Mechanical Engineering Company Limited

PRACTICAL AND CONSULTING ENGINEERS

Builders of "MECOL" Industrial Furnaces for use with oil, gas or coal fuel

Executive Offices
Room 408, 3 St. Nicholas St.
Montreal

General Offices and Works
Three Rivers, Que.

Canadian Steel Foundries Need Frost Improved Sand Mills

WINNING FEATURES



Heavy Mullers
Unloading Device
Motor or Belt Drive

The Frost Mfg. Co.
112 W. Adams St., Chicago

The Hughes Owens Co. Ltd.

MONTREAL TORONTO OTTAWA WINNIPEG

Manufacturers

Blue and Black Print Papers
Drawing Office Supplies for Students,
Architects and Engineers.



ALL STEEL INDEPENDENT CHUCKS

Designed to give strength and durability with high-speed cutting tools. Accurate and dependable always.
We make a complete line of steel chucks, including Geared Scroll Chucks and the Geared Scroll Combination.

UNION MANUFACTURING COMPANY
New Britain, Conn. New York Office: 26 Cortlandt Street

WHEEL TRUEING TOOL CO.

IMPORTERS OF **INDUSTRIAL DIAMONDS** DETROIT MANUFACTURERS OF **DIAMOND POINTED TOOLS**

Goods Submitted on Memorandum if Desired
JOHN W. GORDON, Manager
5 James Street, ST. CATHARINES, ONTARIO

All Mountings Fully Guaranteed
Office and Factory:
88 West Pitt Street, WINDSOR, ONTARIO



WILLSON
GOOGLES

Write for Catalog


Factory in Reading, Pa.



PRESSES and SHEARS
Sheet Metal Working Machinery
THE D. H. STOLL CO., INC.
26 Lansing St., BUFFALO, N.Y.

Miller Bros. & Sons, Limited
Founders, Machinists, Millwrights and Engineers
120 Dalhousie St., Montreal

DAVIS - BOURNONVILLE COMPANY
Welding and Cutting Apparatus
TORONTO, ONTARIO
Factory and Sales Offices: 32-34 Eastern Ave.
MONTREAL, QUEBEC
Sales Offices: Coristine Building
UNITED STATES
Factories and General Offices: Jersey City, N.J., U.S.A.
Branches in Principal Cities of the United States and in Foreign Countries.



DARLING BROTHERS, LIMITED
Engineers, Manufacturers and Founders
120 Prince Street, MONTREAL, P.Q.
*Pumps for any Service—Steam Appliances—
Freight Elevators—Webster Vacuum
Heating System.*

PRESSES—ALL TYPES

Press Attachments, Automatic.
Metal and Wire Forming Machines.
Tumblers—Large Line.
Burnishing Machines. Grinders.
Special Machines.

Baird Machine Co., Bridgeport, Conn., U.S.A.



THE FELLOWS GEAR SHAPER
Used by the Largest Manufacturers in the Gear Industry.
Catalog and Engineering Literature sent to those interested.
Address:
THE FELLOWS GEAR SHAPER CO
SPRINGFIELD, VERMONT, U.S.A.


ENGINEERS PLANNING POWER TRANSMISSIONS
Secure Data and Estimates of "MORSE" DRIVES
SAVE Construction, Space, Light, Fuel. Producing More with Less.
MORSE CHAIN CO., - ITHACA, N.Y.
Engineering Service, Assistance, Bulletins

Atlanta	Chicago	Minneapolis	Pittsburgh
Baltimore	Cleveland	Montreal	San Francisco
Boston	Detroit	New York	St. Louis
Charlotte, N.C.	Kansas City	Philadelphia	

SHEFFIELD ENGINEERING SUPPLIES LIMITED
"DORMER" BRAND
H. S. DRILLS REAMERS STEEL
MILLING-CUTTERS FILES HACK-SAW BLADES
"Safety" Plastic Metallic Packing
230 CRAIG ST. W. MONTREAL, CANADA

"Nichrome" Castings
"Made to Endure High Temperature"
CANADIAN DRIVER-HARRIS Co., Ltd.
WALKERVILLE, ONT.
CANADA

NORTON JACKS
FOR ALL KINDS OF HEAVY LIFTING
Send for complete catalogue showing
50 styles 10 to 100 tons capacity.
Made only by **A. O. NORTON, Limited**
Coaticook, Prov. Quebec, Canada

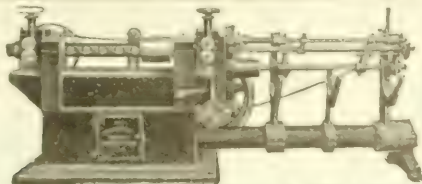


CLUTCHES
Combined Jaw and Friction. Friction only.
Gas Engine Clutches. Jaw Clutches.
Write for interesting printed matter.
The Positive Clutch & Pulley Works, Ltd., Canada
MONTREAL Factory: Aurora, Ont. TORONTO



WE MANUFACTURE RIVETS of every description, $\frac{5}{8}$ inch dia. and smaller

PARMENTER & BULLOCH CO., LTD.
GANANOQUE, ONT.



THE WIRE IS PERFECTLY STRAIGHT

WIRE DRAWING AND CUTTING MACHINES
May we send you catalogue?

The F. B. SHUSTER COMPANY, New Haven, Conn.

Also makers of Reeling Machines, Sprue Cutters, Cutter Pin Machines, etc.

STEEL CASTINGS

ELECTRIC Steel Castings of all kinds from 5 pounds to 5,000 pounds.

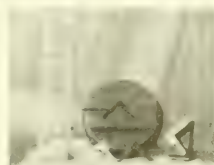
PROMPT DELIVERY

Manitoba Steel Foundries, Ltd.

1204 McArthur Building

Winnipeg

Manitoba



Dies, Jigs and Fixtures

also

Tools of All Kinds

Designed or Made to Your Blueprints Promptly.

RAPID TOOL & MACHINE CO., Limited

172-174 St. Joseph Street, Lachine, Quebec.

Telephones:
Lachine 530 — Melrose 1066

Branch Work:
IBERVILLE, QUE.

McFarlane's Belt Dressings

FOR ALL TYPES OF BELTS

Leather, Canvas, Balata, Cotton, etc.

Preserves the Belts, prevents slipping, jumping, stretching and fraying.

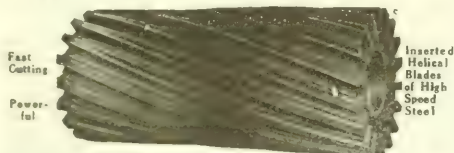
Ensures highest efficiency in transmission of power.

Burgess & Marchand

614 Drummond Bldg.

MONTREAL

Taylor-Newbold Milling Cutters



Will outlive and out-cut any other on the market
4-in. Diameter for General Use.

Send for Bulletin R-P and 30-day trial offer.

THE TABOR MANUFACTURING COMPANY
PHILADELPHIA, PA., U.S.A.

FOR SERVICE ON
Jigs, Fixtures, Gauges
SPECIAL MACHINE TOOLS
SPECIAL MACHINERY

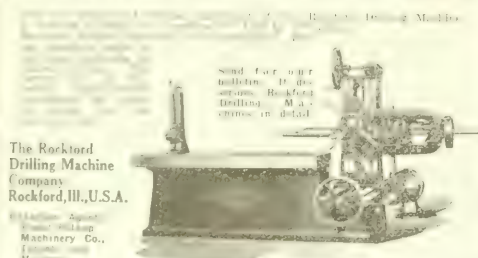
General Machine Work and Repairs

Write

The Crescent Machine Co.
LIMITED

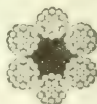
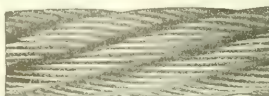
20 Longueuil Lane Montreal, Que.

ROCKFORD DRILLING MACHINES



The Rockford
Drilling Machine
Company
Rockford, Ill., U.S.A.

WIRE ROPE



"We have the Right Rope for every purpose"

We solicit your inquiries

Write for our catalogue

We also manufacture

Wirecloth, Perforated Metal
and Guards for Machinery and Windows

Canada Wire & Iron Goods Co., Hamilton

GRATON & KNIGHT

Standardized Series

LEATHER BELTING

Tanned by us for better use

The Correct Belt for Every Drive

Flat and Round Belting, Leather Packings, Gaskets, Washers, Lace Leathers, Belt Dressings and Cements. Protective Aprons and Hard Leathers.

Canadian Graton & Knight, Ltd., 84 St. Antoine St., Montreal, Canada
Representatives in Canada: Canadian Fairbanks-Morse Co., Limited

Oak Leather Tanners

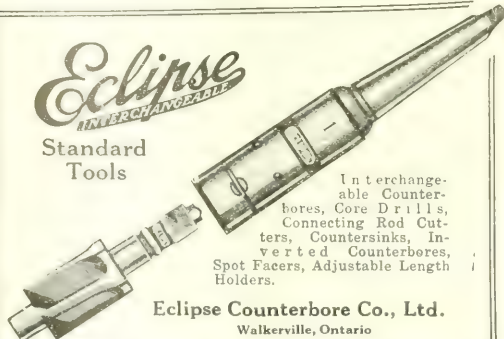
Makers of Belts
and Other
Leather Products



Distributors
and Branches
in All
Principal Cities

Eclipse
INTERCHANGEABLE

Standard
Tools



Interchangeable Counterbores, Core Drills, Connecting Rod Cutters, Countersinks, Inverted Counterbores, Spot Facers, Adjustable Length Holders.

Eclipse Counterbore Co., Ltd.
Walkerville, Ontario

DROP FORGINGS

Medium or light of any description, from 5 lbs. in weight down to the smallest.

Our modern equipment and skilled organization enable us to guarantee satisfactory quality and service.

We solicit your enquiries with drawings or samples, for our prompt quotations.

The STEEL COMPANY OF CANADA, Limited

HAMILTON

TORONTO

MONTREAL

Oliver Swing Cut-Off Saws

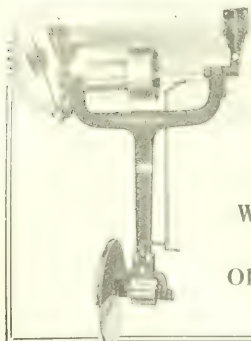
have special features of design which make them especially adapted to hard work.

"Oliver Quality"
Woodworking Machinery

SEND FOR CATALOG

Oliver Machinery Co.

Grand Rapids, Mich., U.S.A.



For Good Gears
**Hamilton Gear
& Mach. Co.**
TORONTO

Any Kind of Gear

We make a specialty of rawhide and steel straight Pinions for landless drives.

"Harry O'Leary and Brook Trout, Jobs" receive special attention. Try a catalogue—it's interesting and contains a lot of gear data.

GEARS AND PINIONS

Philadelphia GEAR Works
Vine St., Philadelphia, Pa.

J.C. McLAREN BELTING



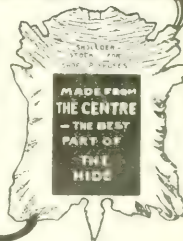
Will Save You Money
In Every Day of Service

Modern plant and thorough knowledge of requirements of belting guarantees perfect satisfaction to all buyers. Our belts are the result of using best leather, and our 57 year's experience.

Ask for Quotations.

J. C. McLAREN BELTING CO.

Montreal Limited Toronto Winnipeg



OAKITE CLEANS

Put your
Cleaning Problems
up to us.

OAKLEY CHEMICAL CO.
64 THAMES STREET, NEW YORK

Machinery Agencies Wanted

A well established machinery supply house in Nova Scotia, covering the entire province, which has been handling American machinery, would like to hear from Canadian manufacturers of the following lines:—

Woodworking Machinery
Ironworking Machinery
Contractors' Machinery
(Hoists, Mixers, etc.)
Pumps
Electric Motors

Address:

MACHINERY
P.O. Box 847
HALIFAX

MORTON MANUFACTURING COMPANY

Muskegon Heights, Mich., U.S.A.

Heavy Duty Draw Out Shapers, Special Heavy Duty Draw Out R.R. Shapers, Special Locomotive Cylinder Planers, Traveling Head Planers, Special Ball Wobble Planers, Portable Planers, Stationary and Portable Keyway Cutters, Finished Machine Keys. See our full page advertisement in the first issue each month of "Canadian Machinery."

OILGAS

INDUSTRIAL
FURNACES

Most modern, efficient and economical heating method. Made in Canada! Full details on request.

General Combustion Co. of Canada, Limited
619-623 New Birks Building, Montreal

Greaves-Etchells Electric Furnace

FURNACES FOR EVERY PURPOSE

Electric Furnace Construction Co.
908 Chestnut Street Phila., Pa.

HÖEGER

Drillers and Auxiliary Drilling Heads
Produce exact work in record time.

Send for Catalog—and remember that Hoefer Service is yours for the asking.

THE HÖEGER MFG. CO., FREEPORT, ILL.
Branches in Principal Cities. 25

MANUFACTURERS' SUPPLIES

*Large Stocks of Various Kinds
of Iron and Steel*

Bar Iron	Cast Steel
Sheet Iron (black and galvanized)	High Speed Steel
Mild Steel	Carbon Steel
Machine Steel	Cold Rolled Steel

*Machine Shop, Foundry, Factory
and Construction Supplies*

Hack Saw Blades	Files
Machine Screws	Starrett; Brown &
Set Screws	Sharpe, and
Cap Screws	other Machinists'
Drills (Carbon and High Speed)	Tools, etc.

Full particulars, prices and delivery dates upon request

RICE LEWIS AND SON LIMITED

ESTABLISHED 1847

TORONTO, ONTARIO

19 VICTORIA STREET

Canadian Machinery Directory

If what you want is not here, write us, and we will tell you where to get it. Let us suggest that you consult also the advertiser index, last page of book, after having secured advertisers' names from this directory. The information you desire may be found in the advertising pages. This department is maintained for the benefit and convenience of our readers. The insertion of our advertisers' names under proper headings is gladly undertaken, but does not become part of an advertising contract.

Abrasive Discs
N. S. Steel Co., Ltd., Hamilton, Ont.
Eng. & Sons, Ltd., London, S.E.
W. & A. Co., Chicago, Ill.

Abrasive Materials
Lid. Mfg. Co., Hamilton, Ont.
Norton & Sons, Ltd., John, London, S.E.
Eng. & Sons, Ltd., London, S.E.
W. & A. Co., Chicago, Ill.

Aerylene, Dissolved
L'Air Liquide Society, Toronto, Ont.

Accumulators, Hydraulic
Can. Hydr. & P. Co., Sarnia, Ont.
Stewart & Co., Ltd., Sarnia, Ont.

Air Lifts
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

Air Purifiers and Coolers
Holden Co., Ltd., Montreal, Que.
Independent Pneumatic Tool, Chicago, Ill.

Analyses, Chemical
Toronto Testing Co., Ltd., Toronto, Ont.

Ankle Bars
Lid. Mfg. Co., Hamilton, Ont.

Anvils
Allanhead Hardware Ltd., Toronto, Ont.
Allanhead Hardware Ltd., Toronto, Ont.
P. & S. Co., Ltd., Toronto, Ont.

Arbors
Atkins & Co., Inc., E. C., Indianapolis, Ind.
Brown & Sons, Ltd., London, S.E.
Ford-Smith Machine Co., Hamilton, Ont.
Ingersoll, Ont.

Armature
J. C. Mfg. Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
P. & S. Co., Ltd., Toronto, Ont.

Axles, Car
Dom. Foundries & Steel, Hamilton, Ont.

Babbitt Metal
Atkins & Co., Inc., E. C., Indianapolis, Ind.
Brown & Sons, Ltd., London, S.E.

Belt Lacing
Canada Metal Co., Ltd., Toronto, Ont.
Fisher Motor Co., Ltd., Orillia, Ont.
Host Metal Co., Toronto, Ont.
Magnolia Metal Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton, Ont.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

N. S. Steel Co., Ltd., New Glasgow, N.S.
Pilot Steel & Tool Co., Montreal, Que.
S. & S. Co., Ltd., Hamilton, Ont.
United Alloy Steel Corp., Canton, Ohio
Vanadium Alloys Steel, Latrobe, Pa.

Bearings, Ball
Canadian SKF Co., Toronto, Ont.
Chapman Double Ball Bearing Co.,
Toronto, Ont.
Lang Mfg. Co., Guelph, Ont.
Lyman Tube & Supply Co., Montreal, Que.
Morse & Sons, Ltd., London, S.E.
Ingersoll, Ont.

Bearings, Bronze
Tallman Brass & Metal Co., Hamilton,
Ont.

Bearings, Die-Cast
Fisher Motor Co., Ltd., Orillia, Ont.
Franklin Die-Casting Corp., Syracuse, N.Y.
Tallman Brass & Metal Co., Hamilton,
Ont.

Bearings, Journal
Fisher Motor Co., Ltd., Orillia, Ont.
Tallman Brass & Metal Co., Hamilton,
Ont.

Bearings, Roller
Lang Mfg. Co., Guelph, Ont.
Lyman Tube & Supply Co., Montreal, Que.
Morse & Sons, Ltd., London, S.E.
Ingersoll, Ont.

Belt Cement
Graton & Knight Mfg. Co., Worcester,
Mass.

Belt Clamps
Graton & Knight Mfg. Co., Worcester,
Mass.

Belt Dressings and Pillers
Allanhead Hardware Ltd., Toronto, Ont.
Dom. Belling Co., Ltd., Hamilton, Ont.
Federal Engr'g Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester,
Mass.

Belt Fasteners
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt Lacing Machine
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.

Belt, Leather
Atkins & Co., Inc., E. C., Indianapolis, Ind.
Can. Fairbanks-Morse Ltd., Montreal, Que.
Federal Engr'g Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester,
Mass.

Belt, Rubber
Can. Consolidated Rubber Co., Ltd.,
Montreal, Que.
Dunlop Tire & Rubber Goods Co., Ltd.,
Toronto, Ont.
Gutta Percha & Rubber, Toronto, Ont.
Quaker City Rubber Co., Philadelphia, Pa.

Belts, Abrasive
Federal Engr'g Co., Ltd., Toronto, Ont.
Oakey & Sons, Ltd., John, London, S.E.,
Eng.

Bench Countershaft Standards
Lid. Mfg. Co., Hamilton, Ont.

Bench, Work
Lid. Mfg. Co., Hamilton, Ont.

Bending Machines, Power
Lid. Mfg. Co., Hamilton, Ont.

Bins, Ore
Lid. Mfg. Co., Hamilton, Ont.

Blocks
Ford Chain Block Co., Philadelphia, Pa.
Wright Mfg. Co., Lisbon, Ohio

Blocks, Chain (See Hoists, Hand)
Allanhead Hardware Ltd., Toronto, Ont.
Ford Chain Block Co., Philadelphia, Pa.
Morris Crane & Hoist Co., Ltd., Niagara
Falls, Ont.
Wright Mfg. Co., Lisbon, Ohio

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Blocks, Die
Lid. Mfg. Co., Hamilton, Ont.

Boring, Drilling and Milling Mach., Vertical
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Mch. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Herbert Ltd., Alfred, Toronto, Ont.

Boring Heads
Lid. Mfg. Co., Hamilton, Ont.

Boring Tools
Lid. Mfg. Co., Hamilton, Ont.

Brakes, Magnetic (for electric furnaces)
Volta Mfg. Co., Welland, Ont.

Brass
Lid. Mfg. Co., Hamilton, Ont.

Bricks, Fire
Lid. Mfg. Co., Hamilton, Ont.

Bridges
Hamilton Bridge Works Co., Ltd., Ham-
ilton, Ont.

Broaching Machines
Bilton Machine Co., Bridgeport, Conn.

Bronze
Brown's Copper & Brass Rolling Mills,
Ltd., Toronto, Ont.
Hiram & W. Co., Montreal, Que.

Bronze, Phosphor
Lid. Mfg. Co., Hamilton, Ont.

Buckers, Carriers, Pivoted
Can. Link-Belt Co., Toronto, Ont.

Buffing or Polishing Machines (See Polishing and Buffing Machines)
Lid. Mfg. Co., Hamilton, Ont.

Bulldozers
Lid. Mfg. Co., Hamilton, Ont.

Burners, Oil and Gas
General Combustion Co. of Can., Ltd.
Petrie Ltd., H. W., Toronto, Ont.
U.S. Electrical Tool Co., Cincinnati, O.

Bushings
Fisher Motor Co., Ltd., Orillia, Ont.
Ingersoll, Ont.

Cabinets, Oil
Lid. Mfg. Co., Hamilton, Ont.

Calipers
Brown & Sharp Mfg. Co., Providence, R.I.

Cams
Lid. Mfg. Co., Hamilton, Ont.

Can-Making Machinery (See Sheet Metal Working Machinery)
Lid. Mfg. Co., Hamilton, Ont.

Cars, Ore
MacKinnon Steel Co., Sherbrooke, Que.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

Castings, Aluminum
Canada Electric Castings Co., Ltd., Orillia,
Ont.

BUYERS' DIRECTORY

Gages, Snap, Thread and Cylindrical
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.
A. J. Gages Mfg. Co., 100, Broadview Ave.,
Toronto, Ont.
A. J. Gages Mfg. Co., 100, Broadview Ave.,
Toronto, Ont.

Gages, Special Measuring (See Tool Work)
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.
A. J. Gages Mfg. Co., 100, Broadview Ave.,
Toronto, Ont.

Gages, Standard
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.
A. J. Gages Mfg. Co., 100, Broadview Ave.,
Toronto, Ont.

Gages, Thread
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.
A. J. Gages Mfg. Co., 100, Broadview Ave.,
Toronto, Ont.

Garnet Emery and Flint Paper and Ritehy Supply Co., Toronto, Ont.
Gas, Coal Compressed
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gas, Compressed
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gaskets
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gear Blanks
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gear-Cutting Machines
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gear Testing Machines
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gears, Cast
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gears, Cut
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gears, Dress
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gears, Forged
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gears, Herringbone
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gears, Machine Moulded
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gears, Rawhide (See Gears, Cut)
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gears, Silent Chain
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Gears, Worm
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Generators, Acetylene
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Generators, Electric
Accurate Ltd., 100, Broadview Ave.,
Toronto, Ont.

Petrie, Ltd., H. W. Toronto, Ont.

Goggles, Safety
Petrie, Ltd., H. W. Toronto, Ont.

Grab Buckets
Petrie, Ltd., H. W. Toronto, Ont.

Grease Caps, Pressed Steel and Brass
Petrie, Ltd., H. W. Toronto, Ont.

Greases, Lubricating
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Discs
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Abrasive Belt
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Automatic
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Bench
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Universal
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Thread
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machinery, Tool Post
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Chaser
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Cutter and Reamer
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Cylindrical
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Die
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Disc
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Drill
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Face
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Floor and Tool
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Portable
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Snagging
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Surface
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Thread
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machinery, Tool Post
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Universal
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Chaser
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Cutter and Reamer
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Cylindrical
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Die
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Disc
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Drill
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Face
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Floor and Tool
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Universal
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Thread
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machinery, Tool Post
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Chaser
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Cutter and Reamer
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Cylindrical
Petrie, Ltd., H. W. Toronto, Ont.

Grinding Machines, Die
Petrie, Ltd., H. W. Toronto, Ont.

Hammers, Riveting
Petrie, Ltd., H. W. Toronto, Ont.

Hangers, Shafting
Petrie, Ltd., H. W. Toronto, Ont.

Hardening, Case-Hardening and Tempering
Petrie, Ltd., H. W. Toronto, Ont.

Hardness Testing Apparatus
Petrie, Ltd., H. W. Toronto, Ont.

Hobbing Machines
Petrie, Ltd., H. W. Toronto, Ont.

Hobs
Petrie, Ltd., H. W. Toronto, Ont.

Hoists, Electric
Petrie, Ltd., H. W. Toronto, Ont.

Hoists, Hand
Petrie, Ltd., H. W. Toronto, Ont.

Hoists, Pneumatic
Petrie, Ltd., H. W. Toronto, Ont.

Holders-On, Pneumatic
Petrie, Ltd., H. W. Toronto, Ont.

Hose, Industrial
Petrie, Ltd., H. W. Toronto, Ont.

Hose, Rubber
Petrie, Ltd., H. W. Toronto, Ont.

Hydraulic Leather
Petrie, Ltd., H. W. Toronto, Ont.

Hydraulic Machinery
Petrie, Ltd., H. W. Toronto, Ont.

Index Centers
Petrie, Ltd., H. W. Toronto, Ont.

Igniters, Gas Engine
Petrie, Ltd., H. W. Toronto, Ont.

Indicators, Speed and Test
Petrie, Ltd., H. W. Toronto, Ont.

Insulation
Petrie, Ltd., H. W. Toronto, Ont.

Jacks, Hydraulic
Petrie, Ltd., H. W. Toronto, Ont.

Jacks, Planer
Petrie, Ltd., H. W. Toronto, Ont.

Jigs and Fixtures (See Tool Work)
Petrie, Ltd., H. W. Toronto, Ont.

Fisher Motor Co. Ltd. Oshawa, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Gisholt Machine Co., Madison, Wis.
Hamilton Engineering Service, Ltd.,
Hamilton, Ont.
Rapid Tool & Machine Co., Machine Que.

Keyseating Machines

Bilton Machine Co., Bridgeport, Conn.
Garlock-Walker Mch. Co., Toronto, Ont.
Morton Mfg. Co., Muskegon, Mich.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co. of Canada, Ltd.,
Dundas, Ont.

Kerns, Machine

Carl Drawn Steel Co., Hamilton, Ont.
Garlock-Walker Mch. Co., Toronto, Ont.
Morton Mfg. Co., Muskegon, Mich.

Knives, Machine

Adkins & Co., Inc., E. C., Indianapolis, I.
Canada Machinery Corp., Galt, Ont.
Oiler Machine Co., Grand Rapids, Mich.
Simonds Canada Saw Co., Montreal, Que.

Knurl Holders

Pratt & Whitney Co. of Canada, Ltd.,
Dundas, Ont.

Lacing Leather

Clippert Belt Lacer Co., Grand Rapids,
Mich.
Main Belting Co. of Can., Montreal, Que.

Lamps, Electric

Federal Eng'g Co., Ltd., Toronto, Ont.
Northern Electric Co., Montreal, Que.

Lathe Attachments

Canada Machinery Corp., Galt, Ont.
Hendey Machine Co., Torrington, Conn.
Hendey Machine Co., Torrington, Conn.
Petrie, Ltd., H. W., Toronto, Ont.

Lathe Pans, Portable

Canada Machinery Corp., Galt, Ont.

Lathe Tools

Armstrong Bros. Tool Co., Chicago, Ill.
Can. Atlas Machine Tools Co., Ltd.,
Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hendey Machine Co., Torrington, Conn.

Lathe, Automatic and Semi-Auto-

matic
Atkins & Co., Inc., E. C., Indianapolis, I.
Gisholt Machine Co., Madison, Wis.
Herbert Ltd., Alfred, Toronto, Ont.
Jones & Lamson Machine Co., Springfield,
Vermont.

Lathe, Bench

Armstrong Bros. Tool Co., Chicago, Ill.
Pratt & Whitney Co. of Canada, Ltd.,
Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Steuhr Turret Machine Co., Madison, Wis.

Lathe, Boring

Bertram & Son Co., Ltd., The John,
Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Steuhr Turret Machine Co., Madison, Wis.

Lathe, Chucking (See Lathes, Hor-

izontal Turret, and Lathes, Ver-

tical Turret)

Acme Machine Tool Co., Ltd., The John,
Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield,
Vermont.

Lathe, Drilling

McDonald Co., Ltd., R. Galt, Ont.
Steuhr Turret Machine Co., Madison, Wis.
Warner & Swasey Co., Cleveland, Ohio.

Lathe, Engine

Atkins & Co., Inc., E. C., Indianapolis, I.
Bertram & Son Co., Ltd., The John,
Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Foss Machinery & Supply Co., Geo. F.,
Montreal, Que.

Lathe, Horizontal

Garlock-Walker Mch. Co., Toronto, Ont.
Hendey Machine Co., Torrington, Conn.
Hendey Machine Co., Torrington, Conn.
Petrie, Ltd., H. W., Toronto, Ont.

Lathe, Vertical

McDonald Co., Ltd., R. Galt, Ont.
Steuhr Turret Machine Co., Madison, Wis.
Warner & Swasey Co., Cleveland, Ohio.

Lathe, Universal

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Lathe, Wood Turning

Canada Machinery Corp., Galt, Ont.
Greenfield Tap & Die Corp., Galt, Ont.
Hendey Machine Co., Torrington, Conn.
Lehmann Machine Co., St. Louis, Mo.

Lathe, Universal

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Lathe, Wood Turning

Canada Machinery Corp., Galt, Ont.
Greenfield Tap & Die Corp., Galt, Ont.
Hendey Machine Co., Torrington, Conn.
Lehmann Machine Co., St. Louis, Mo.

Lathe, Universal

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Lathe, Wood Turning

Canada Machinery Corp., Galt, Ont.
Greenfield Tap & Die Corp., Galt, Ont.
Hendey Machine Co., Torrington, Conn.
Lehmann Machine Co., St. Louis, Mo.

BUYERS' DIRECTORY

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Metals, Alloy

Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Foundries & Forgings Co., Wel-

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

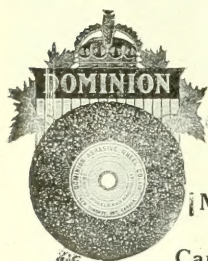
Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

Milling Machines, Vertical

Garlock-Walker Mch. Co., Toronto, Ont.
Herbert Ltd., Alfred, Toronto, Ont.

We have for our and your requirements, a large stock of assorted White Iron Stars, suitable for light agricultural to medium weight machinery castings, while they last, at 8 cents per lb. F. O. B. Galt.



Made
in
Canada
Grinding
Wheels

Times Have Changed!

In order to obtain grinding wheels of consistent quality, many manufacturers purchased imported wheels. But times have changed! It is no longer necessary to turn away from home-made goods.

Dominion Grinding Wheels are made in Canada of abrasives from our own furnaces. We have found that this is the only way to be sure the quality runs uniform to grade and grain.

Give Dominion Wheels a trial. You will find them equal to the best grade of imported wheels—and you save duty and exchange.

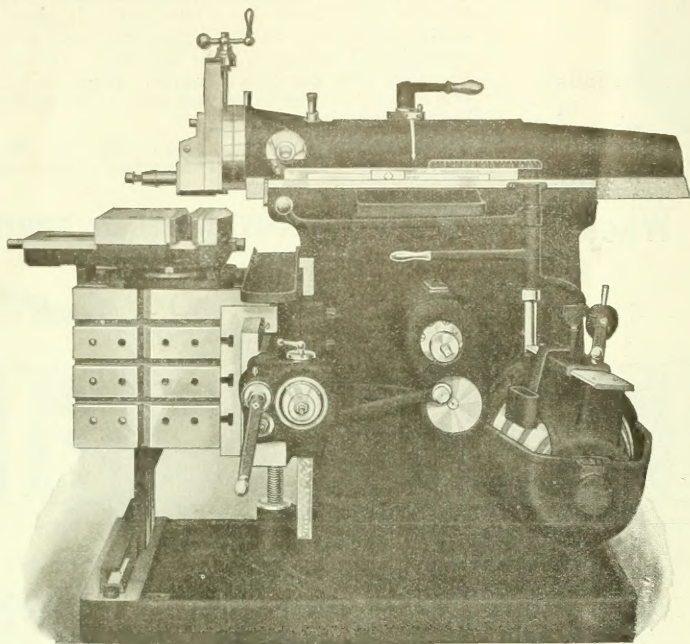
DOMINION ABRASIVE WHEEL CO., LIMITED
MIMICO - ONTARIO

Reliable Quality

INDEX TO ADVERTISERS

A		Dominion Abrasive Wheel Co.		95	J		Philadelphia Gear Works.....	85
Ackworth Ltd., J.	22	Dom. Forge & Stamping Co.	74	Jardine & Co., A. B.	13	Pilot Steel & Tool Co.	71	
Algoma Steel Corporation	4	Dom. Foundries & Steel, Ltd.	9	Johnson Machine Co., Carlyle.	8	Positive Clutch & Pulley Wks.	83	
Aikenhead Hardware Co.	63	Dom. Steel Products	67	Jones & Glassco	6	Pratt & Whitney, Inside front cover	75	
American Pulley Co.	73	Dunbar Bros., The	75	Joyce-Koebel Co.	74	Prest-O-Lite Co.	75	
Armstrong Bros. Tool Co.	73	E		K		Puro Sanitary Drinking Fountain Co.	66	
Armstrong Whitworth Co. of Can.	19	Eclipse Counterbore Co.	85	Katie Foundry	94	R		
Atkins & Co., E. C.	61	Electric Furnace Construction Co.	86	Kearney & Trecker Co.	16	Rapid Tool & Machine Co.	84	
Atkins & Co., W.	19	Co.	86	Keller Pneumatic Tool Co.	12	Rice Lewis & Sons, Ltd.	86	
B		Elk Fire Brick Co.	81	Kennedy & Sons, Ltd., Wm.	12	Ritchey Supply Co.	27	
Baird Machine Co.	83	F		Kimber & Hillier Mfg. Co.	67	Rockford & Co., W. S.	73	
Bertram & Sons Co., John	1	Fellows Gear Shaper Co.	83	L		Rockford Drilling Co.	84	
Bertrams Ltd.	67	Fetherstonhaugh & Co.	67	Landis Tool Co.	18	Rockford Milling Mach. Co.	80	
Bilton Machine Co.	28	Fisher Motor Co., Ltd.	8	La Salle Tool Co.	22	Roeelson Mach. & Tool Co.	17	
Bliss Co., E. W.	26	Ford-Smith Machine Co.	10	M		S		
Bowser & Co.	12	Frost Mfg. Co.	82	MacKinnon Steel Co.	20	Selson Engineering Co., Ltd.	78	
Brantford Oven & Rack Co.	67	G		Manitoba Steel Foundries, Ltd.	84	Sheffield Engineering Supplies, Ltd.	83	
Bristol Company	80	Galt Machine Screw Co.	79	Manning Abrasive Co.	27	Shepard Electric Crane & Hoist Co.	21	
British Smelting and Refining Co.	81	Garlock-Walker Mach. Co.	69	Marion & Marion	67	Co.	21	
Brown, Boggs Co., Ltd.	11	General Combustion Co.	86	McDougall Co., Ltd., R.	28	Sluyster Co., F. B.	84	
Brown & Sharpe Mfg. Co.	29	Geometric Tool Co.	39	McLaren Belting Co., J. C.	85	Sidney Tool Co.	7	
Burgess & Marchand	84	Gosley & Edlund	83	Mechanical Engineering Co.	82	Skinner Chuck Co.	79	
C		Graton & Knight	85	Miller Bros. & Sons	83	Starrett Co., L. S.	15	
Canada Foundries & Forgings, Ltd.	75	Guilford & Sons	86	Morrow Screw & Nut Co., John	65	Steel Co. of Can.	85	
Canada Machinery Corporation Outside back cover		H		Morse Chain Co.	83	Steinie Turret Machine Co.	82	
Canada Metal Co.	23	Hamilton Engineering Service.	67	Morse Twist Drill & Machine Co.	7	Stoll Co., D. H.	83	
Canada Wire & Iron Goods Co.	20	Hanna & Co., M. A.	71	Morton Mfg. Co.	86	T		
Can. Atlas Crucible Steel Co.	31	Heald Machine Co.	25	Moore & Son, Thos.	81	Tabor Mfg. Co.	84	
Can. Desmond-Stephen Mfg. Co., Ltd.	80	Henry & Wright Mfg. Co.	7	N		Tallman Brass & Metals, Ltd.	23	
Can. Driver-Harris Co.	71	Hendey Machine Co.	96	National Acme Co.	2, 77	Terry & Co., John M.	20	
Can. Drawn Steel Co.	71	Hepburn, John T.	6	Nicholson File Co.	13	Toledo Machine & Tool Co.	78	
Can. Fairbanks-Morse Co.	32	Hoefler Mfg. Co.	86	Northern Crane Works	82	Traburn Pump Division	12	
Can. Steel Foundries	9	Holden Co.	76	Northern Electric Co.	cover	Tube Co. of Canada, Ltd.	6	
Classified Advertising	68, 69	Holly, R. S.	69	O		U		
Clemson Bros., Inc.	3	Hoyt Metal Co.	7	Norton Co. of Canada, Ltd.	30	Union Mfg. Co.	82	
Crane, Ltd.	82	Hughes Owens Co., Ltd.	82	Norton, A. O.	83	United States Elec. Tool Co.	13	
Crescent Machine Co.	84	Hull Iron & Steel Foundries.	79	Nova Scotia Steel & Coal Co.	18	V		
D		I		P		W		
Darling Bros., Ltd.	83	Independent Pneumatic Tool Co.	74	Oakley Chemical Co.	85	Walton Co.	78	
Davidson Mfg. Co., Ltd.	21	Ingersoll File Co.	71	Oliver Machinery Co.	85	Wheel Trueing Tool Co.	83	
Davis-Bourneville Co.	83	Ingersoll Machine Co.	14	Parmenter Bulloch Co.	83	Williams Co., J. H.	10	
Dodge Mfg. Co.	70	Illingsworth Steel Co., John	13	Perrin, Ltd., W.	23	Williams Machinery Co., A. R.	57	
Diamond Saw & Stamping Wks.	6	J		Petrie Ltd., W. H.	5	Willson Goggles, Inc.	83	

HENDEY



Some machines are just like those chaps who suffer from temperament—they have to be humored and only work right when conditions are just so.

Is there any better way to avoid such machines than by taking into careful consideration the reputations for

dependable service of the various machines on the market?

Take, for example, this 20-inch Hendey Crank Shaper. Undoubtedly you know some shops which are using at least one of these machines. Ask them their opinion as to its reliability.

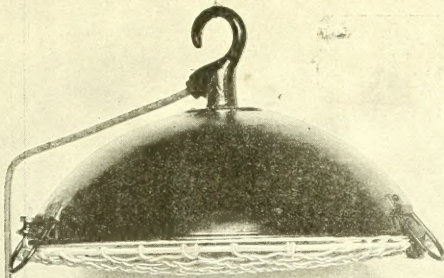
**Your search for a thoroughly dependable shaper
is ended when you investigate the Hendey.**

The Hendey Machine Company

Torrington, Conn., U.S.A.

CANADIAN AGENTS:

A. R. Williams Machinery Co., Vancouver	A. R. Williams Machinery Co., St. John, N.B.
A. R. Williams Machinery Co., Toronto	A. R. Williams Machinery Co., 260 Princess St., Winnipeg.
Williams & Wilson, Montreal.	



Cab Tire Cable

The Cable De Luxe for
Industrial Purposes

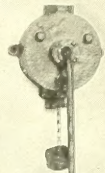
This advertisement illustrates:

A length of Northern Electric Cab Tire Cable
One Northern Electric No. 511 Marine Plug and Receptacle
One Northern Electric No. 407 Cargo Cluster

This portable combination is specially adapted for use in shipping departments of industrial plants and in loading and unloading operations on board ships, in railway yards and in general construction work.

Cab Tire Cable is exceptionally flexible and durable and is ideal for use in localities where dampness or gas fumes abound and where other types of cable would be subject to mechanical injury.

Our nearest house will be glad to give your inquiries immediate attention.



Northern Electric Company
LIMITED

Montreal
Ottawa

Quebec
Hamilton

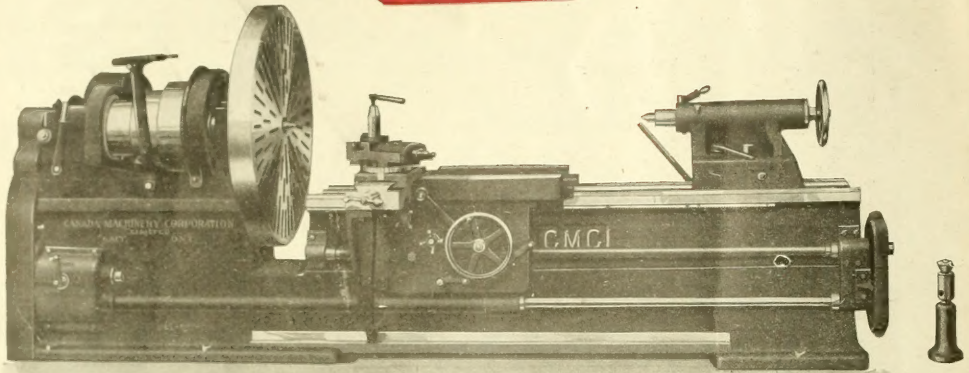
Toronto
Windsor

London

Regina
Winnipeg

Edmonton
Calgary

Halifax
Vancouver



26" x 48" Extension Bed Engine Lathe

Canadian Built Machine Tools of The Highest Grade

Who got the \$20,000,000 exchange premium on the Canadian Dollar last year for payment on imported goods?

Buy Canadian-made tools and help make the Canadian Dollar worth one hundred cents everywhere.

We build Machine Tools of the highest grade only, which are quite the equal of imported machines.

Besides, users of C.M.C. machines get the advantage of the service a home manufacturer can give.

CANADA MACHINERY CORPORATION
LIMITED

GALT :: ONTARIO